SWITZERLAND

The Report referred to in Article 9 of Directive 2003/99/EC

TRENDS AND SOURCES OF ZOONOSES AND ZOONOTIC AGENTS IN HUMANS, FOODSTUFFS, ANIMALS AND FEEDINGSTUFFS

including information on foodborne outbreaks, antimicrobial resistance in zoonotic agents and some pathogenic microbiological agents.

IN 2011
## INFORMATION ON THE REPORTING AND MONITORING SYSTEM

**Country:** Switzerland  
**Reporting Year:** 2011

<table>
<thead>
<tr>
<th>Laboratory name</th>
<th>Description</th>
<th>Contribution</th>
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<td>SFVO</td>
<td>Swiss Federal Veterinary Office</td>
<td>Swiss Zoonoses Report</td>
</tr>
<tr>
<td>SFOPH</td>
<td>Swiss Federal Office of public health</td>
<td>Foodborne outbreaks, Swiss Zoonoses Report</td>
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<td>ZOBA</td>
<td>Centre for Zoonoses, Bacterial Animal Diseases Antimicrobial Resistance at</td>
<td>National Reference Laboratory for Brucellosis, Salmonellosis, Campylobacteriosis, Listeriosis, Yersiniosis, Antimicrobial Resistance</td>
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<td></td>
<td>Institute of Veterinary Bacteriology, Vetsuisse Faculty, University of Bern</td>
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<tr>
<td>ILS</td>
<td>Institute for Food Safety and Hygiene, Vetsuisse Faculty University of Zurich</td>
<td>National Reference Laboratory for STEC, enteropathogenic bacteria</td>
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<tr>
<td>IVB</td>
<td>Institute of Veterinary Bacteriology, Vetsuisse Faculty University of Zurich</td>
<td>National Reference Laboratory for Coxiellosis, Tuberculosis</td>
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<tr>
<td>IPB</td>
<td>Institute of Parasitology, Vetsuisse Faculty and Faculty of Medicine</td>
<td>National Reference Laboratory for Trichinellosis, Toxoplasmosis</td>
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<td>University of Bern</td>
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<td>SRC</td>
<td>Swiss Rabies Center at the Institute of Veterinary Virology, Vetsuisse</td>
<td>National Reference Laboratory for Rabies</td>
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<tr>
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<td>Faculty University of Bern</td>
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<tr>
<td>IPZ</td>
<td>Institute of Parasitology, Vetsuisse Faculty University of Zurich</td>
<td>National Reference Laboratory for Echinococcosis</td>
</tr>
<tr>
<td>ALP</td>
<td>Research Station Agroscope Liebefeld-Posieux</td>
<td>Official feed inspection service and Listeria Monitoring</td>
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PREFACE

This report is submitted to the European Commission in accordance with Article 9 of Council Directive 2003/99/ EC*. The information has also been forwarded to the European Food Safety Authority (EFSA).

The report contains information on trends and sources of zoonoses and zoonotic agents in Switzerland during the year 2011.

The information covers the occurrence of these diseases and agents in humans, animals, foodstuffs and in some cases also in feedingstuffs. In addition the report includes data on antimicrobial resistance in some zoonotic agents and commensal bacteria as well as information on epidemiological investigations of foodborne outbreaks. Complementary data on susceptible animal populations in the country is also given. The information given covers both zoonoses that are important for the public health in the whole European Community as well as zoonoses, which are relevant on the basis of the national epidemiological situation.

The report describes the monitoring systems in place and the prevention and control strategies applied in the country. For some zoonoses this monitoring is based on legal requirements laid down by the Community Legislation, while for the other zoonoses national approaches are applied.

The report presents the results of the examinations carried out in the reporting year. A national evaluation of the epidemiological situation, with special reference to trends and sources of zoonotic infections, is given. Whenever possible, the relevance of findings in foodstuffs and animals to zoonoses cases in humans is evaluated.

The information covered by this report is used in the annual Community Summary Report on zoonoses that is published each year by EFSA.

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1. ANIMAL POPULATIONS

The relevance of the findings on zoonoses and zoonotic agents has to be related to the size and nature of the animal population in the country.
A. Information on susceptible animal population

Sources of information
Living animals and herds: Coordinated census of agriculture. Swiss federal office of agriculture and Swiss federal office of statistics.
Slaughtered animals: Official meat inspection statistics (FVO) and monthly agricultural statistics (Swiss Farmer’s Federation).

Dates the figures relate to and the content of the figures
Number of animals hold in farms in Switzerland in 2011 (data status May 2012). Number of animals slaughtered in the year 2011.

Definitions used for different types of animals, herds, flocks and holdings as well as the types covered by the information
The indicated number of holdings is identical to the number of farms holding respective species. Agriculture census counts the number of farms. Farms with more than one holding per species are rare in Switzerland.

National evaluation of the numbers of susceptible population and trends in these figures
The number of cattle holdings as well as the number of animals decreased by 2 and 1.1% respectively compared to the previous year. The number of pig, sheep and goat farms declined by 4.1%, 3.1% and 2.9%. Numbers of holdings with breeding hens have a large fluctuation due to a large number of very small flocks on farms which are counted in agricultural census. The number of holdings with laying hens was stable. The number of broiler holdings increased by 6.5%. 37 holdings with more than 100 breeding hens keep 90% of all breeding hens. Over 90% of poultry meat is produced by 4 major meat producing companies.

Geographical distribution and size distribution of the herds, flocks and holdings
Average size of the farms in 2011: 39 cattle, 180 pigs, 45 sheep, 14 goats, 196 laying hens, 5593 broilers.

Additional information
Day-old chicks and hatching eggs are imported on a large scale and reared in Switzerland. In 2011 about 862'530 day-old chicks (mainly from France, the Netherlands and Germany) and 24.9 million fertilized eggs of the broiler type (mainly from France, the Netherlands and Denmark) were imported.
### Table Susceptible animal populations

<table>
<thead>
<tr>
<th>Animal species</th>
<th>Category of animals</th>
<th>Number of herds or flocks</th>
<th>Number of slaughtered animals</th>
<th>Livestock numbers (live animals)</th>
<th>Number of holdings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Data</td>
<td>Year*</td>
<td>Data</td>
<td>Year*</td>
</tr>
<tr>
<td>Cattle (bovine animals)</td>
<td>- in total</td>
<td>655985</td>
<td>1583151</td>
<td>4018</td>
<td></td>
</tr>
<tr>
<td></td>
<td>breeding flocks, unspecified - in total</td>
<td></td>
<td>148867</td>
<td>1189</td>
<td></td>
</tr>
<tr>
<td>Gallus gallus (fowl)</td>
<td>laying hens</td>
<td></td>
<td>3260496</td>
<td>16642</td>
<td></td>
</tr>
<tr>
<td></td>
<td>broilers</td>
<td>5560556</td>
<td>5996193</td>
<td>1072</td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td>- in total</td>
<td>30715</td>
<td>81467</td>
<td>5889</td>
<td></td>
</tr>
<tr>
<td>Pigs</td>
<td>- in total</td>
<td>2827506</td>
<td>1572590</td>
<td>8747</td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td>- in total</td>
<td>241934</td>
<td>416272</td>
<td>9266</td>
<td></td>
</tr>
<tr>
<td>Solipeds, domestic</td>
<td>horses - in total</td>
<td>3115</td>
<td>55186</td>
<td>8837</td>
<td></td>
</tr>
<tr>
<td>Turkeys</td>
<td>- in total</td>
<td></td>
<td>58443</td>
<td>268</td>
<td></td>
</tr>
</tbody>
</table>

*Only if different than current reporting year

**Comments:**

1) The number of slaughtered turkeys is not available. 1'411 tons of turkey meat were produced in 2011.
2. INFORMATION ON SPECIFIC ZOONOSES AND ZOONOTIC AGENTS

Zoonoses are diseases or infections, which are naturally transmissible directly or indirectly between animals and humans. Foodstuffs serve often as vehicles of zoonotic infections. Zoonotic agents cover viruses, bacteria, fungi, parasites or other biological entities that are likely to cause zoonoses.
2.1 SALMONELLOSION

2.1.1 General evaluation of the national situation

A. General evaluation

History of the disease and/or infection in the country

Salmonellosis in humans is a notifiable disease. The detection of Salmonella spp. must be reported by the laboratory within one week (ordinance of the FDHA on doctor and laboratory reports). In the 80s Salmonellosis was the most reported food borne disease in humans. After reaching a peak in 1992 with 113.4 reports per 100,000 inhabitants the incidence declined steadily resulting in a takeover of Campylobacteriosis as the most reported food borne disease in humans in 1995. Depart from 2004 the incidence was never over 30.0 reports per 100,000 inhabitants. S. Enteritidis has always been the most frequently isolated serovar followed by S. Typhimurium.

From 2002 until 2009 cheese production in cheese-making facilities was officially sampled and monitored for Salmonella in a national surveillance programme. As in the recent years no Salmonella were detected, the official testing on Salmonella in dairy products was stopped in 2009.

A study in broiler meat at retail in 2007 showed, that Swiss products from poultry had a low Salmonella prevalence (products originating from Switzerland had a prevalence of 0.4% compared to 15.3% within imported products). A baseline study on the prevalence and antimicrobial resistance of Salmonella spp. in broiler carcasses carried out in 2008 resulted in a prevalence of Salmonella in broiler carcasses of 2.6%

Next to salmonellosis (see chapter salmonella in all animals) also the infection with Salmonella is notifiable. From 1995 until 2006 the infection of chicken with S. Enteritidis was notifiable and a control programme was in place for breeding flocks and laying hen flocks (TSV, Article 255-261). During this period the incidence of S. Enteritidis infection in breeding flocks and laying hen flocks has steadily declined from 38 to 3 infected flocks per year. This control programme was expanded 2007 to other serovars and species (TSV, Article 255-261) according to the regulation 2160/2003 of the European community. In 2009 the state control programme was extended to broiler flocks. Up to date detection of S. Enteritidis and S. Typhimurium in breeding flocks, laying hens, broilers and turkeys are covered in this control programme, in breeding flocks in addition S. Hadar, S. Virchow and S. Infantis. Since 2007, no more than 3 cases per year in poultry were reported.

Baseline studies were carried out in 2005 – 2008 resulting in the following prevalence estimates: in laying hens 1.3 % (2006), in broilers 0.3%(2007), in slaughter pigs 2.3% (2007) and in breeding pigs 12.9% (2008). The prevalence in slaughter pigs was on an equal level as in previous research studies. 60% of the detected serovars (9 of 15 serovars) were either S. Enteritidis or S. Typhimurium proving once again the clear presence of these two serovars in the pig population. As breeding pigs have not been addressed in recent research this prevalence cannot be compared with previous data. The presence of S. Enteritidis or S. Typhimurium was with 27% (8 of 30 serovars) significantly less dominant than in slaughter pigs.

National evaluation of the recent situation, the trends and sources of infection

1’300 diagnostically confirmed cases of salmonellosis were reported in 2011 (1’179 cases in the previous year). This represents a notification rate of 16 per 100'000 inhabitants (15/100'000 in 2010). The number of salmonella cases has been on a declining trend for the last few years and stagnated in 2011. Similar to previous years, the most affected age group was young kids under 5 years (56/100’000). The most frequently reported serovars were S. Enteritidis (27%), followed by S. Typhimurium (20%) and the
monophasic strain 4,12,:i:- (13%). There is an ongoing outbreak of S. Bardo since May 2011, which has affected 90 people until the end of 2011. S. Bardo is a very rare serovar and the source of infection still remains unknown.

In the framework of the control programme, 2 cases of salmonella infections in poultry were detected (1x S. Enteritidis in broilers and 1x S. Typhimurium in laying hens 2011).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

By comparison with other countries, Switzerland has relatively few cases of salmonellosis. Despite the steady decline in human cases, salmonellosis is still the second most common zoonosis in Switzerland. Since many years most cases in humans are caused by S. Enteritidis and S. Typhimurium. The longstanding control programme is showing its effect here. Salmonella are very rarely found in poultry. In broiler chickens, the first two years of control showed the presence of different Salmonella serotypes, with the first detection of one of the controlled serovars (S. Enteritidis) in 2010. It remains unclear to what extent pigs and cattle play a part as reservoirs for infection in humans. Stepping up and expanding the national control programme might be needed in order to further reduce human salmonellosis cases.

Recent actions taken to control the zoonoses


Additional information

1. In a Salmonella Kentucky study conducted in 2010 (Bonalli et al.) 106 human Salmonella Kentucky strains, isolated from patients between 2004 and 2009, were genotyped using PFGE. There was some evidence of a non-recognised outbreak of S. Kentucky in 2006. Travels to North Africa were a risk factor for S. Kentucky infection. [Bonalli, M., Stephan, R., Käppeli, U., Cernela, N., Adank, L., Hächler, H. Salmonella enterica serotype Kentucky associated with human infections in Switzerland: genotype and resistance trends 2004-2009, International Food Research (May 2011)]
2. The poultry industry takes responsibility for the monitoring of broilers and poultry meat production in a system of self-auditing. More information can be found in the relevant chapters.
3. Further information can be found on the FVO website www.bvet.admin.ch.
### 2.1.2 Salmonellosis in humans

#### Table Salmonella in humans - Species/serotype distribution

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases</th>
<th>Cases Inc.</th>
<th>Autochthon cases</th>
<th>Autochthon Inc.</th>
<th>Imported cases</th>
<th>Imported Inc.</th>
<th>Unknown status</th>
</tr>
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<tbody>
<tr>
<td>Salmonella</td>
<td>1300</td>
<td>16.39</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>S. Enteritidis</td>
<td>350</td>
<td>4.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. Typhimurium</td>
<td>258</td>
<td>3.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. Derby</td>
<td>13</td>
<td>0.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. Napoli</td>
<td>18</td>
<td>0.22</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>S. Stanley</td>
<td>21</td>
<td>0.26</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salmonella spp., unspecified</td>
<td>265</td>
<td>3.3</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>S. Hadar</td>
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<td>0.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>S. Infantis</td>
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<td>0.26</td>
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<td>S. 4,12:i:-</td>
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<td>S. Corvalis</td>
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<td>90</td>
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<td>S. Bareilly</td>
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<tr>
<td>S. Virchow</td>
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<td>0.3</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>S. Saintpaul</td>
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<td>0.07</td>
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<tr>
<td>S. Kentucky</td>
<td>14</td>
<td>0.17</td>
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<td>Table Salmonella in humans - Species/serotype distribution</td>
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</table>
### Table Salmonella in humans - Age distribution

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>8</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>1 to 4 years</td>
<td>50</td>
<td>19</td>
<td>31</td>
</tr>
<tr>
<td>5 to 14 years</td>
<td>64</td>
<td>37</td>
<td>27</td>
</tr>
<tr>
<td>15 to 24 years</td>
<td>50</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td>25 to 44 years</td>
<td>78</td>
<td>37</td>
<td>41</td>
</tr>
<tr>
<td>45 to 64 years</td>
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<td>40</td>
<td>28</td>
</tr>
<tr>
<td>65 years and older</td>
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<td>21</td>
<td>10</td>
</tr>
<tr>
<td>Age unknown</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Total :</td>
<td>350</td>
<td>180</td>
<td>170</td>
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</table>
Table Salmonella in humans - Seasonal distribution

<table>
<thead>
<tr>
<th>Seasonal Distribution</th>
<th>Months</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>Salmonella spp.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Cases</td>
<td>Cases</td>
<td>Cases</td>
</tr>
<tr>
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<td>February</td>
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<td>March</td>
<td></td>
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<td>16</td>
<td>66</td>
</tr>
<tr>
<td>April</td>
<td></td>
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<td>13</td>
<td>74</td>
</tr>
<tr>
<td>May</td>
<td></td>
<td>35</td>
<td>18</td>
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<tr>
<td>December</td>
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<td>17</td>
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<td>89</td>
</tr>
<tr>
<td>Total :</td>
<td></td>
<td>350</td>
<td>258</td>
<td>1300</td>
</tr>
</tbody>
</table>
2.1.3 Salmonella in foodstuffs

A. Salmonella spp. in broiler meat and products thereof

Preventive measures in place
The Hygiene Ordinance lays down limits for Salmonella in various foods. If these limits are exceeded, the cantonal laboratories are required to report this to the FOPH. The foods affected are confiscated and destroyed. Depending on the situation, the products may be recalled, and a warning is issued to the population.

Results of the investigation
The industry takes responsibility for the monitoring for poultry meat in a system of self-auditing. Results of the Salmonella monitoring of the largest poultry producers and abattoirs are available covering more than 90% of the production. Samples are taken several times a year at random. Fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see poultry meat table). In 2011 2405 tests were done (including 60% single samples; excluding imported meat) of which 0.7% proved positive for Salmonella spp. (7x S. Typhimurium, 1x S. Enteritidis, 1x S. enterica subsp. enterica 4,12:i:- (monophasic strain) and 7x Salmonella spp. not identified).
Switzerland - 2011 Report on trends and sources of zoonoses

B. Salmonella spp. in turkey meat and products thereof

Preventive measures in place

The Hygiene Ordinance lays down limits for Salmonella in various foods. If these limits are exceeded, the cantonal laboratories are required to report this to the FOPH. The foods affected are confiscated and destroyed. Depending on the situation, the products may be recalled, and a warning is issued to the population.

Results of the investigation

The industry takes responsibility for the monitoring for poultry meat in a system of self-auditing. Results of the Salmonella monitoring of the largest poultry producers and abattoirs are available covering more than 90% of the production. Samples are taken several times a year at random. In 2011 119 samples of fresh turkey meat, turkey meat preparations and turkey meat products (excluding imported meat) were tested at different stages such as slaughterhouse, cutting plant and processing plant (see poultry meat table). All samples were tested Salmonella negative.
Monitoring system

Sampling strategy

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities imported from third countries. As commodities from third countries can only be inspected at the airports and because this mode of importation is quite expensive not many samples can be tested.

Results of the investigation

In 2011 53 raw fish samples from Vietnam, Ghana, Uganda, Senegal and Morocco as well as 20 beef meat samples from Brazil, Chile and Argentina were tested Salmonella negative.
Preventive measures in place

It is the responsibility of the producers to implement a hygiene concept that guarantees the safety of their products. The Hygiene Ordinance lays down limits for Salmonella in various foods. If these limits are exceeded, the cantonal laboratories are required to report this to the FOPH. The foods affected are confiscated and destroyed. Depending on the situation, the products may be recalled, and a warning is issued to the population. All the larger cheese manufacturers have a hygiene management system in place that conforms to ISO 9000.
### Table Salmonella in poultry meat and products thereof

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<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
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</thead>
<tbody>
<tr>
<td>Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance (HACCP and own checks)</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Industry sampling</td>
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Table Salmonella in poultry meat and products thereof

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<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
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<th>Units tested</th>
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<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
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<tr>
<td>Meat from broilers (Gallus gallus) - minced meat -</td>
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<td></td>
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<tr>
<td>at cutting plant - Surveillance (HACCP and own checks)</td>
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### Table Salmonella in poultry meat and products thereof

<table>
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<td>Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)</td>
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<td>Meat from turkey - fresh - at processing plant - imported - Surveillance (HACCP and own checks)</td>
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<tr>
<td>Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)</td>
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<tr>
<td>Meat from turkey - fresh - at slaughterhouse - Surveillance (HACCP and own checks)</td>
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<tr>
<td>Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)</td>
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<td>Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)</td>
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<td>Meat from turkey - mechanically separated meat (MSM) - at cutting plant - Surveillance (HACCP and own checks)</td>
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### Table Salmonella in other food

<table>
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<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
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</thead>
<tbody>
<tr>
<td>Fish - at border control - Monitoring (food imported from third countries)</td>
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<td>FVO</td>
<td>Selective sampling</td>
<td>Official sampling</td>
<td>food sample</td>
<td>Single</td>
<td>25g</td>
<td>53</td>
<td>0</td>
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<tr>
<td>Meat from bovine animals - at border control - Monitoring (food imported from third countries)</td>
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<td>FVO</td>
<td>Selective sampling</td>
<td>Official sampling</td>
<td>food sample</td>
<td>Single</td>
<td>25g</td>
<td>20</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Comments:**

1) fish from Vietnam, Uganda, Senegal and Morocco
2) beef meat from Brazil, Chile and Argentina

**Footnote:**
The FVO runs a border inspection programme in which risked-based random samples are taken from commodities imported from third countries. As commodities from third countries can only be inspected at the airports and because this mode of importation is quite expensive not many samples can be tested.
2.1.4 Salmonella in animals

A. Salmonella spp. in Gallus Gallus - breeding flocks

Vaccination policy
Breeding flocks (separate elite, grand parent and parent flocks when necessary)
   Vaccination is prohibited.

Control program/mechanisms
The control program/strategies in place
   Breeding flocks (separate elite, grand parent and parent flocks when necessary)
   Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1003/2005. Since 1 January 2007, the control programme covers breeding holdings with more than 250 places. The samples of poultry breeding flocks that were obtained from one-day chicks, in the rearing or the production phase, contained materials such as shell residues, meconium, empty chick eggs, dead chicks, basket lining or environmental samples (cumulative samples of faeces, drag swabs, boot swabs, dust). They are taken six times under official supervision: three times during the rearing phase (at ages 1–3 days, 4–5 weeks, 15 –20 weeks, and two weeks before being moved to the laying house) as well as three times during the laying phase (beginning, middle and end). Salmonella serotypes S. Enteritidis, S. Typhimurium, S. Hadar, S. Infantis and S. Virchow are subject to state control measures.

Measures in case of the positive findings or single cases
   Breeding flocks (separate elite, grand parent and parent flocks when necessary)
   If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist. In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. In breeding flocks the animals are killed and the eggs are no longer allowed to be used for fertilisation purposes. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place
   The Swiss ordinance of epizootics covers Salmonella infection in poultry (TSV, Article 255-261) as notifiable animal disease.

Results of the investigation
   In the control programme none of the tested breeding flocks were positive for salmonella. There was one suspect case in breeding flocks for S. Enteritidis which was not confirmed.
National evaluation of the recent situation, the trends and sources of infection
Since many years tested breeding flocks were always negative for Salmonella. The target of the control programme could be reached.

Additional information
Further information can be found on the FVO website www.bvet.admin.ch.
B. Salmonella spp. in Gallus Gallus - broiler flocks

Monitoring system
Sampling strategy
Broiler flocks
Flocks with at least 5,000 broiler places are being monitored since January 1st 2009.

Vaccination policy
Broiler flocks
Vaccination is prohibited.

Control program/mechanisms
The control program/strategies in place
Broiler flocks
Control measures in broiler flocks according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 646/2007 were implemented and are in force since 01.01.2009. The national control programme covers broiler flocks on farms with at least 5000 places. In broiler flocks, the samples are taken from drag swabs or boot swabs shortly before slaughter. The flocks are tested three weeks at the earliest before slaughter. An official sample is taken from a flock on 10% of farms; in all other flocks testing is commissioned by the animal owner. Salmonella serotypes S. Enteritidis and S. Typhimurium are subject to state control measures.

Measures in case of the positive findings or single cases
Broiler flocks: Before slaughter at farm
If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist. In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The infected flocks must be slaughtered or culled. In broiler and laying flocks the fresh meat and eggs either have to be disposed of or subjected to treatment in order to destroy the Salmonella before being marketed as food. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place
Notifiable disease in animals according to Swiss ordinance of epizootics (TSV, Art. 5).

Results of the investigation
In the framework of the national control programme, 5 flocks were tested positive for Salmonella (1x S. Enteritidis, 1x S. Jerusalem, 1x S. Yoruba, 1x S. Bredeney, 1x S. Indiana). Thus, there was one positive broiler flock covered by the target of the control programme.
Switzerland - 2011 Report on trends and sources of zoonoses

National evaluation of the recent situation, the trends and sources of infection
The target of the control programme could be reached. The baseline study conducted in broiler flocks in 2007 showed, that Salmonella prevalence in broilers in Switzerland is low (0.3%). Switzerland wants to maintain the current situation by applying the afore-mentioned control measures.

Additional information
Further information can be found on the FVO website www.bvet.admin.ch.
Vaccination policy

Laying hens flocks

Vaccination is prohibited.

Control program/mechanisms

The control program/strategies in place

Laying hens flocks

Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 1168/2006. The control programme covers all flocks of laying hens on farms with at least 1000 places. Samples from laying hens may contain eggs, blood or environmental samples and are taken during the rearing and production phase: twice under official supervision (aged 15 –20 weeks (the latest two weeks before being moved to the laying house) as well as nine weeks at the earliest before slaughter). S. Enteritidis and S. Typhimurium are subject to state control measures.

Measures in case of the positive findings or single cases

Laying hens flocks

If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist. In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks is forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The infected flocks must be slaughtered or culled. In broiler and laying flocks the fresh meat and eggs either have to be disposed of or subjected to treatment in order to destroy the Salmonella before being marketed as food. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place

The Swiss ordinance of epizootics covers Salmonella infection in poultry (TSV, Article 255-261) as notifiable animal disease.

Results of the investigation

In the framework of the national control programme, 2 laying hen flocks were tested positive for Salmonella (1x S. Typhimurium, 1x S. Tennessee) in 2011. Thus, there was one flock positive for a serovar covered by the target. In addition, there was one suspect case in laying hens for S. Enteritidis which was not confirmed.

National evaluation of the recent situation, the trends and sources of infection

The target of the control programme could be reached. The prevalence of Salmonella spp. in flocks of laying hens in Switzerland in the recent years is low. This was approved by the baseline study on the prevalence of Salmonella in laying flocks of Gallus Gallus in 2006 where Salmonella prevalence was 1.3%.
Apart from the flocks tested in the framework of the control programme, one laying hen flock, which had less than 1000 places, was tested S. Enteritidis positive in 2011. Since many years not more than 3 cases of Salmonella infection in laying hens per year are reported.

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.
Control program/mechanisms

The control program/strategies in place
Breeding flocks (separate elite, grand parent and parent flocks when necessary)

Control measures according to the Swiss ordinance of epizootics (TSV, Article 255-261) and Commission Regulation (EC) No. 584/2008. The control programme covers all flocks of turkeys on farms with at least 500 places. Samples from turkeys contain environmental samples and are taken 3 to 6 weeks before slaughter. S. Enteritidis and S. Typhimurium are subject to state control measures.

Measures in case of the positive findings or single cases

If Salmonella serotypes subject to control measures are detected in the environment, there is a suspicion of Salmonella infection. In the event of a suspected infection, the official veterinarian samples further test material as soon as possible (20 killed animals or fallen stock per flock) and submits the meat and organs to bacteriological testing for Salmonella. If testing reveals Salmonella serotypes whose control is of significance to public health, a Salmonella infection covered in the control programme does exist. In the event of a definitive positive finding, a simple first-degree quarantine is imposed on the flock (Article 69 TSV): To prevent the disease from spreading, animal movements are prohibited. All direct contacts between birds that are subject to the quarantine and birds from other flocks are forbidden. The quarantined flocks must not be changed either by moving animals to other flocks or by introducing animals from other flocks. The infected flocks must be slaughtered or culled. Flocks positive for S. Enteritidis or S. Typhimurium have to be culled or, if slaughtered, the fresh meat must be subjected to treatment in order to destroy the Salmonella before being marketed as food. The quarantine conditions are lifted when all animals have been killed and the premises cleaned, disinfected and the freedom from Salmonella of the premises checked by official sampling after disinfection by means of bacteriological testing.

Notification system in place

The Swiss ordinance of epizootics covers Salmonella infection in poultry (TSV, Article 255-261) as notifiable animal disease.

Results of the investigation

In the framework of the national control programme, one flock of turkeys was tested positive for Salmonella (1x S. Indiana) in 2011. Thus, there was no positive flock for a serovar covered by the target.

National evaluation of the recent situation, the trends and sources of infection

The target of the control programme could be reached. Prevalence data in turkeys in the framework of a baseline study do not exist. As there are not many turkey flocks and Salmonella has not appeared to be a specific problem in turkeys in Switzerland, the baseline study on the prevalence of Salmonella in turkey flocks was not conducted.

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.
Control program/mechanisms
The control program/strategies in place
Animal keepers, livestock inspectors, AI technicians, animal health advisory services, meat inspectors, abattoir personnel, police and customs officers are under an obligation to report any suspected case of salmonellosis in animals to a veterinarian. If Salmonella are confirmed in a suspected case by a diagnostic laboratory, this must be reported to the cantonal veterinarian who is responsible for the livestock.

Measures in case of the positive findings or single cases
If biungulates are affected, the sick animals must be isolated and the whole herd and the environment must be tested. Only healthy animals from this herd (even if they might be excreting Salmonellae) may be slaughtered, but then only with a special official permit and subject to appropriate precautions at the abattoir. If salmonellosis is detected in cows, goats or dairy sheep, the cantonal veterinarian must inform the cantonal health and food safety authorities. Milk from animals that are excreting Salmonella must not be used for human consumption and may only be used as animal feed after pasteurisation or boiling. If the disease occurs in animals other than biungulates, appropriate action must likewise be taken to prevent any risk to humans.

Notification system in place
Salmonellosis in animals is a notifiable diseases and classified as animal diseases to be controlled (Swiss ordinance of epizootics (TSV), Article 222-227).

Results of the investigation
In the past 10 years (2002-2011) 713 salmonellosis cases were recorded to the FVO by cantonal veterinarians ranging between 55 and 83 cases per year since 2007. Almost half of them (45%) occurred in livestock (mainly cows), one quarter in reptiles and 18% in dogs/cats.
In 2011, 55 cases of Salmonellosis were reported to the FVO by cantonal veterinarians (18 in cattle, 22 in reptiles, 8 in dogs and cats, 3 in sheep, 1 in domestic birds, 1 in horses, 1 in poultry and 1 in other zoo animals).
In veterinary diagnostic laboratories 5223 tests for salmonellosis were carried out in the context of clinical investigations, mainly in cattle (35%), dogs (23%), cats (16%), birds (7%), horses (5%) and pigs (4%) (see table). Only antigen testing was included.

National evaluation of the recent situation, the trends and sources of infection
Salmonellosis cases in animals are frequently reported.
### Table Salmonella in breeding flocks of Gallus gallus

<table>
<thead>
<tr>
<th></th>
<th>No of flocks under control programme</th>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Target Verification</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
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</thead>
<tbody>
<tr>
<td>Gallus gallus (fowl) - breeding flocks for broiler production line - adult - at farm - Control and eradication programmes</td>
<td>51</td>
<td>cantons</td>
<td>Census</td>
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<td>Official sampling</td>
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<td>Official and industry sampling</td>
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<td>Official sampling</td>
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<td>Census</td>
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<td>Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes</td>
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<td>cantons</td>
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<td>Census</td>
<td>Official sampling</td>
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<td>cantons</td>
<td>Census</td>
<td>HACCP and owns check</td>
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<td>Flock</td>
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### Table Salmonella in breeding flocks of Gallus gallus

<table>
<thead>
<tr>
<th>No of flocks under control programme</th>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Target Verification</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
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<tr>
<td>Gallus gallus (fowl) - breeding flocks for egg production line - day-old chicks - at farm - Control and eradication programmes</td>
<td>111</td>
<td>cantons</td>
<td>Census</td>
<td>Official sampling</td>
<td>animal sample</td>
<td>no</td>
<td>Flock</td>
<td>11</td>
<td>0</td>
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<tr>
<td>Gallus gallus (fowl) - breeding flocks for egg production line - during rearing period - at farm - Control and eradication programmes</td>
<td>111</td>
<td>cantons</td>
<td>Census</td>
<td>Official sampling</td>
<td>animal sample</td>
<td>no</td>
<td>Flock</td>
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<table>
<thead>
<tr>
<th>S. Hadar</th>
<th>S. Infantis</th>
<th>S. Typhimurium</th>
<th>S. Virchow</th>
<th>S. 1,4,[5],12:i:</th>
<th>Salmonella spp., unspecified</th>
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### Table Salmonella in breeding flocks of Gallus gallus

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<th>S. Hadar</th>
<th>S. Infantis</th>
<th>S. Typhimurium</th>
<th>S. Virchow</th>
<th>S. 1,4,[5],12:i: -</th>
<th>Salmonella spp., unspecified</th>
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<tr>
<td>Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes</td>
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<td>Gallus gallus (fowl) - breeding flocks for egg production line - adult - at farm - Control and eradication programmes</td>
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### Table Salmonella in other animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Salmonella</th>
<th>S. Enteritidis</th>
<th>S. Typhimurium</th>
<th>S. 1,4,[5],12:i-</th>
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<td>FVO</td>
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### Table Salmonella in other animals

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<td>Dogs - Clinical investigations</td>
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Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of “clinical investigations”.

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<th>Sample Origin</th>
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<th>Sampling unit</th>
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<td>cantons</td>
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### Table Salmonella in other poultry

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### 2.1.5 Salmonella in feedingstuffs

#### Table Salmonella in compound feedingstuffs

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**Note:** All samples were official sampling for feed sample taken as a single 25g sample.
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Footnote:
ALP = Institute Agroscope Liebefeld Posieux, official feed inspection service
### Table Salmonella in feed material of animal origin

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<th>S. Typhimurium</th>
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**Footnote:**

ALP = Institute Agroscope Liebefeld Posieux, official feed inspection service
Table Salmonella in other feed matter

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<th>S. Typhimurium</th>
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<td>Feed material of oil seed or fruit origin - linseed derived - at feed mill - Surveillance</td>
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</table>

Footnote:

ALP = Institute Agroscope Liebefeld Posieux, official feed inspection service
2.1.6 Antimicrobial resistance in Salmonella isolates

A. Antimicrobial resistance in Salmonella in cattle

Sampling strategy used in monitoring

Frequency of the sampling
Samples were collected from clinical or subclinical material.

Type of specimen taken
Clinical samples

Procedures for the selection of isolates for antimicrobial testing
All Salmonella isolates were submitted to susceptibility testing.

Methods used for collecting data
All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates
Samples were cultured and identified using standard microbiological procedures.

Laboratory used for detection for resistance

Antimicrobials included in monitoring
ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing
Wherever possible the epidemiological cut-off values according to EUCAST were used.

Preventive measures in place
No specific preventive measures for antimicrobial resistance in Salmonella. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation
29 Salmonella spp. isolates from cattle were available for susceptibility testing. 24 S. Typhimurium (5 of them S. 4,12:i:-), 3 S. Ohio and 2 S. Infantis were available. High prevalences of resistance to ampicillin, streptomycin, sulfamethoxazol, tetracycline and trimethoprim were found in S. Typhimurium isolates from cattle (22 - 39%).

National evaluation of the recent situation, the trends and sources of infection
Resistance was most frequently observed against antimicrobials that have been used in food animals for many years. No resistances against third-generation cephalosporins were found.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)
Salmonella prevalence in healthy animals in Switzerland is very low, therefore Salmonella isolates from clinical material are used for Monitoring.

Additional information
Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
B. Antimicrobial resistance in Salmonella in pigs

Sampling strategy used in monitoring

Frequency of the sampling

Samples were collected from clinical or subclinical material.

Type of specimen taken

Clinical samples

Procedures for the selection of isolates for antimicrobial testing

All Salmonella isolates were submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured and identified using standard microbiological procedures.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing

Wherever possible the epidemiological cut-off values according to EUCAST were used.

Preventive measures in place

No specific preventive measures for antimicrobial resistance in Salmonella. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation

2 Salmonella Typhimurium isolates from pigs were available for susceptibility testing. No resistance against the tested antimicrobials was found.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
Sampling strategy used in monitoring

Frequency of the sampling
Samples were collected from clinical or subclinical material.

Type of specimen taken
Clinical samples

Procedures for the selection of isolates for antimicrobial testing
All Salmonella isolates were submitted to susceptibility testing.

Methods used for collecting data
All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates
Samples were cultured and identified using standard microbiological procedures.

Laboratory used for detection for resistance
Antimicrobials included in monitoring
ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

Cut-off values used in testing
Wherever possible the epidemiological cut-off values according to EUCAST were used.

Preventive measures in place
No specific preventive measures for antimicrobial resistance in Salmonella. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation
21 Salmonella spp. isolates from birds were available for susceptibility testing. 5 S. Typhimurium, 8 S. Enteritidis, 2 S. Indiana, 1 S. Tenessee, 1 S. Gallinarum, 1 S. Jerusalem, 1 S. Virchow, 1 S. Wien and 1 S. Yoruba. Moderate to high prevalences of resistance to ampicillin, streptomycin, sulfamethoxazol, tetracycline and trimethoprim were found in Salmonella spp. isolates from birds (14 - 24%). One isolate (S. Indiana) was resistant against third-generation cephalosporins and therefore is suspected to be an ESBL producer.

National evaluation of the recent situation, the trends and sources of infection
Resistance was most frequently observed against antimicrobials that have been used in food animals for many years. Resistance against newer antimicrobials more critical for human health (fluoroquinolones, cephalosporines) was rare.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)
Salmonella prevalence in healthy animals in Switzerland is very low, therefore Salmonella isolates from clinical material are used for Monitoring.

Additional information
Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.
### Table Antimicrobial susceptibility testing of S. Durban in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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<thead>
<tr>
<th>Antimicrobials:</th>
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</thead>
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<td>Cutoff value</td>
<td>N</td>
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<td>2</td>
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<tr>
<td>Aminoglycosides - Kanamycin</td>
<td>8</td>
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<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>16</td>
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<tr>
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<tr>
<td>Amphenicols - Florfenicol</td>
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<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
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<tr>
<td>Penicillins - Ampicillin</td>
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<tr>
<td>Quinolones - Nalidixic acid</td>
<td>16</td>
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<tr>
<td>Tetracyclines - Tetracycline</td>
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<tr>
<td>Trimethoprim</td>
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<tr>
<td>Cephalosporins - Ceftazidim</td>
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<tr>
<td>Polymyxins - Colistin</td>
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<td>Antimicrobials:</td>
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<td>Aminoglycosides - Gentamicin</td>
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<td>Aminoglycosides - Streptomycin</td>
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<td>Fluoroquinolones - Ciprofloxacin</td>
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</table>
Table Antimicrobial susceptibility testing of S. Enteritidis in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Antimicrobials:

<p>| Antimicrobials                              | Cut-off value | N  | n  | &lt;=0.002 | &lt;=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5  | 1    | 2    | 4    | 8    | 16   | 32   | 64   | 128  | 256  | 512  | &gt;4096 | 1024 | 2048 |
|--------------------------------------------|---------------|----|----|---------|---------|-------|-------|-------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| Aminoglycosides - Gentamicin               | 2             | 3  | 0  | 1       | 2       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Aminoglycosides - Kanamycin                | 8             | 3  | 0  |         | 3       |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Aminoglycosides - Streptomycin             | 16            | 3  | 0  |         |         | 1     | 1     | 1     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Amphenicols - Chloramphenicol              | 16            | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Amphenicols - Florfenicol                  | 16            | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Cephalosporins - Cefotaxime                | 0.5           | 3  | 0  |         |         | 1     | 2     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Fluoroquinolones - Ciprofloxacin           | 0.06          | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Penicillins - Ampicillin                   | 8             | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Quinolones - Nalidixic acid                | 16            | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Tetracyclines - Tetracycline               | 8             | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Trimethoprin                               | 2             | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Cephalosporins - Ceftazidim                | 2             | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Polymyxins - Colistin                      | 2             | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| Sulfonamides - Sulfamethoxazol             | 256           | 3  | 0  |         |         |       |       |       |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |</p>
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<th>Number of isolates available in the laboratory</th>
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### Table Antimicrobial susceptibility testing of S. Lome in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Lome in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]
## Table Antimicrobial susceptibility testing of S. Jerusalem in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >4096 | 1024 | 2048 |
|----------------|---------------|---|---|---------|---------|-------|-------|-------|------|------|------|------|------|----|---|---|---|---|---|---|---|---|----|----|----|-----|-----|
| Gentamicin     |               | 2 | 1 |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Kanamycin      |               | 8 | 1 |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Streptomycin   |               | 16| 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Chloramphenicol|               |   |   |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Florfenicol    |               | 16| 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Cefotaxime     |               | 0.5| 1 |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Ciprofloxacin  |               | 0.06| 1|         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Amoxicillin    |               | 8 | 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Nalidixic acid |               | 16| 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Tetracycline   |               | 8 | 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Tetracycline   |               |   |   |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Trimethoprim   |               | 2 | 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Cefotaxime     |               | 2 | 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Polymyxins - Colistin |   | 2 | 1  |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |
| Sulfadiazine   |               | 256| 1 |         |         |       |       |       |      |      |      |      |      |     |   |   |   |   |   |   |   |   |    |    |    |      |     |

Switzerland - 2011 Report on trends and sources of zoonoses
Table Antimicrobial susceptibility testing of S. Jerusalem in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Bredeney in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Bredeney in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. enterica subsp. arizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. enterica subsp. arizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >1024 | 2048 |
|----------------|---------------|---|---|---------|---------|-------|-------|-------|-------|-------|-------|-------|-------|-----|---|---|---|---|---|---|---|---|---|---|---|---|
| Aminoglycosides - Gentamicin | 2 | 4 | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Kanamycin | 8 | 4 | 0 | 4 | | | | | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Streptomycin | 16 | 4 | 1 | 1 | 2 | 1 | | | | | | | | | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 4 | 0 | 2 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 4 | 0 | 2 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 4 | 0 | 3 | 1 | | | | | | | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 4 | 0 | 2 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 4 | 0 | 1 | 2 | 1 | | | | | | | | | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 4 | 0 | 4 | | | | | | | | | | | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 4 | 2 | 1 | 1 | 2 | | | | | | | | | | | | | | | | | | | | |
| Trimethoprim | 2 | 4 | 0 | 4 | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins - Ceftazidim | 2 | 4 | 0 | 4 | | | | | | | | | | | | | | | | | | | | |
| Polymyxins - Colistin | 2 | 4 | 0 | 4 | | | | | | | | | | | | | | | | | | | | |
| Sulfonamides - Sulfamethoxazol | 256 | 4 | 0 | 1 | 1 | 2 | | | | | | | | | | | | | | | | | | | | |
### Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of *S. enterica* subsp. *salamae* in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of *S. enterica* subsp. *salamae* in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Wien in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table: Antimicrobial susceptibility testing of S. Wien in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Montevideo in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

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### Table Antimicrobial susceptibility testing of S. Montevideo in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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<th>Antimicrobials</th>
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Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobialss:</th>
<th>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</th>
<th>S. Typhimurium</th>
<th>Other animals - unspecified - Clinical investigations</th>
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### Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

<table>
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<th>Antimicrobials</th>
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Table Antimicrobial susceptibility testing of S. Typhimurium in Solipeds, domestic - horses - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

S. Typhimurium

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### Table Antimicrobial susceptibility testing of S. Typhimurium in Solipeds, domestic - horses - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

### Antimicrobials:

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<th>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</th>
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<td>Aminoglycosides - Kanamycin</td>
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<td>Aminoglycosides - Streptomycin</td>
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### S. Typhimurium, monophasic

<table>
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<th>Number of isolates available in the laboratory</th>
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Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Gallinarum in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >2048 |
|----------------|--------------|---|---|---------|---------|-------|-------|-------|-------|-------|-------|-------|-----|----|---|---|---|---|---|---|---|---|---|---|---|
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | 0 |
| Aminoglycosides - Kanamycin | 8 | 1 | 0 | 1 |
| Aminoglycosides - Streptomycin | 16 | 1 | 1 | 1 |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | 1 |
| Amphenicols - Florfenicol | 16 | 1 | 0 | 1 |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | 1 |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | 1 |
| Penicillins - Ampicillin | 8 | 1 | 0 | 1 |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | 1 |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | 1 |
| Trimethoprim | 2 | 1 | 0 | 1 |
| Cephalosporins - Ceftazidim | 2 | 1 | 0 | 1 |
| Polymyxins - Colistin | 2 | 1 | 1 | 1 |
| Sulfonamides - Sulfamethoxazol | 256 | 1 | 0 | 1 |
### Table Antimicrobial susceptibility testing of S. Gallinarum in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
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<th>Number of isolates available in the laboratory</th>
<th>Antimicrobials</th>
<th>Isolates out of a monitoring program (yes/no)</th>
<th>Number of isolates available in the laboratory</th>
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<td>Aminoglycosides - Streptomycin</td>
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Table Antimicrobial susceptibility testing of *S. enterica subsp. diarizonae* in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Tennessee in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Tennessee in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Yoruba in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

Isolates out of a monitoring program (yes/no)
Number of isolates available in the laboratory

unknown
Table Antimicrobial susceptibility testing of S. Yoruba in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Ohio in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - organ/tissue - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

#### Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >4096 | 1024 | 2048 |
|-----------------|---------------|---|---|---------|---------|-------|-------|-------|------|------|------|------|-----|----|----|---|---|---|---|---|---|---|---|----|-----|-----|-----|-----|
| Aminoglycosides - Gentamicin | 2 | 2 | 0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Kanamycin | 8 | 2 | 0 | | | | | | | 2 | | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Streptomycin | 16 | 2 | 0 | | | | | | | | 1 | 1 | | | | | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 2 | 0 | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 2 | 0 | | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 2 | 0 | | | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 2 | 0 | | | 2 | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 2 | 0 | | | | | | | 1 | 1 | | | | | | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Trimethoprim | 2 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins - Ceftazidim | 2 | 2 | 0 | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | | | | |
| Polymyxins - Colistin | 2 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulfonamides - Sulfamethoxazol | 256 | 2 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

*Isolates out of a monitoring program (yes/no)*
*Number of isolates available in the laboratory*
### Table Antimicrobial susceptibility testing of S. Typhimurium in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

| Antimicrobials:          | Other animals - unspecified - Clinical investigations
|--------------------------|---------------------------------------------------------------
|                          | Isolates out of a monitoring program (yes/no)                |
|                          | Number of isolates available in the laboratory               |
|                          | unknown                                                       |
| Antimicrobials:          | lowest  | highest |
| Aminoglycosides - Gentamicin | 0.25   | 32      |
| Aminoglycosides - Kanamycin | 4      | 128     |
| Aminoglycosides - Streptomycin | 2      | 128     |
| Amphenicols - Chloramphenicol | 2      | 64      |
| Amphenicols - Florfenicol | 2      | 64      |
| Cephalosporins - Cefotaxime | 0.06   | 4       |
| Fluoroquinolones - Ciprofloxacin | 0.008 | 8       |
| Penicillins - Ampicillin | 0.5    | 32      |
| Quinolones - Nalidixic acid | 4      | 64      |
| Tetracyclines - Tetracycline | 1      | 64      |
| Trimethoprim              | 0.5    | 32      |
| Cephalosporins - Ceftazidim | 0.25   | 16      |
| Polymyxins - Colistin     | 2      | 4       |
| Sulfonamides - Sulfamethoxazol | 8      | 1024    |
### Table Antimicrobial susceptibility testing of S. Typhimurium in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

#### Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

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Table Antimicrobial susceptibility testing of S. Typhimurium in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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<tr>
<td>Sulfamethoxazol</td>
<td>8</td>
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Table Antimicrobial susceptibility testing of S. Typhimurium, monophasic in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >1024 | 2048 |
|----------------|--------------|---|---|---------|---------|-------|-------|-------|-------|-------|-------|-------|-----|----|---|---|---|---|---|---|---|---|----|-----|-----|-----|---|
| Aminoglycosides - Gentamicin | 2 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 4 |
| Aminoglycosides - Kanamycin | 8 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 5 |
| Aminoglycosides - Streptomycin | 16 | 5 | 1 | | | | | | | | | | | | | | | | | | | | | | 1 |
| Amphenicols - Chloramphenicol | 16 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 5 |
| Amphenicols - Florfenicol | 16 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 5 |
| Cephalosporins - Cefotaxime | 0.5 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 4 |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 4 |
| Penicillins - Ampicillin | 8 | 5 | 1 | | | | | | | | | | | | | | | | | | | | | | 1 |
| Quinolones - Nalidixic acid | 16 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 5 |
| Tetracyclines - Tetracycline | 8 | 5 | 4 | | | | | | | | | | | | | | | | | | | | | | 4 |
| Trimethoprim | 2 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 5 |
| Cephalosporins - Ceftazidim | 2 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 3 |
| Polymyxins - Colistin | 2 | 5 | 0 | | | | | | | | | | | | | | | | | | | | | | 5 |
| Sulfonamides - Sulfamethoxazol | 256 | 5 | 1 | | | | | | | | | | | | | | | | | | | | | | 1 |

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

Switzerland - 2011 Report on trends and sources of zoonoses
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<th>highest</th>
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### Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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<th>S. Enteritidis</th>
<th>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</th>
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<td>Cut-off value</td>
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<tr>
<td>Cephalosporins - Cefotaxime</td>
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<td>Tetracyclines - Tetracycline</td>
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<td>Trimethoprim</td>
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<td>Sulfonamides - Sulfamethoxazol</td>
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**Isolates out of a monitoring program (yes/no)**: unknown

**Number of isolates available in the laboratory**
Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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<td>Isolates out of a monitoring program (yes/no)</td>
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<td>Number of isolates available in the laboratory</td>
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</tbody>
</table>

**Antimicrobials:**

- Aminoglycosides - Gentamicin: lowest 0.25, highest 32
- Aminoglycosides - Kanamycin: lowest 4, highest 128
- Aminoglycosides - Streptomycin: lowest 2, highest 128
- Amphenicols - Chloramphenicol: lowest 2, highest 64
- Amphenicols - Florfenicol: lowest 2, highest 64
- Cephalosporins - Cefotaxime: lowest 0.06, highest 4
- Fluoroquinolones - Ciprofloxacin: lowest 0.008, highest 8
- Penicillins - Ampicillin: lowest 0.5, highest 32
- Quinolones - Nalidixic acid: lowest 4, highest 64
- Tetracyclines - Tetracycline: lowest 1, highest 64
- Trimethoprim: lowest 0.5, highest 32
- Cephalosporins - Ceftazidim: lowest 0.25, highest 16
- Polymyxins - Colistin: lowest 2, highest 4
- Sulfonamides - Sulfamethoxazol: lowest 8, highest 1024
Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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<td>Fluoroquinolones - Ciproflaxacin</td>
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Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

S. Enteritidis

unknown
### Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

<table>
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<th>Antimicrobials</th>
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#### Antimicrobials:

- **Aminoglycosides - Gentamicin**: 0.25 - 32
- **Aminoglycosides - Kanamycin**: 4 - 128
- **Aminoglycosides - Streptomycin**: 2 - 64
- **Amphenicols - Chloramphenicol**: 2 - 64
- **Amphenicols - Florfenicol**: 0.06 - 4
- **Cephalosporins - Cefotaxime**: 0.008 - 8
- **Fluoroquinolones - Ciprofloxacin**: 0.5 - 32
- **Polymyxins - Colistin**: 0.25 - 16
- **Trimethoprim**: 0.5 - 32
- **Sulfonamides - Sulfamethoxazol**: 2 - 4
### Table Antimicrobial susceptibility testing of S. Indiana in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

**Concentration (µg/ml), number of isolates with a concentration of inhibition equal to**

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<th>Antimicrobials:</th>
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Table Antimicrobial susceptibility testing of S. Indiana in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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</tr>
<tr>
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<tr>
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</tr>
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<td>Polymyxins - Colistin</td>
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<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
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## Table Antimicrobial susceptibility testing of S. Braenderup in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >2048 |
|-----------------|---------------|---|---|---------|---------|-------|-------|-------|------|------|------|------|-----|---|---|---|---|---|---|----|----|----|----|----|---|
| Aminoglycosides - Gentamicin | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Kanamycin | 8 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Streptomycin | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Amphenicols - Florfenicol | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins - Cefotaxime | 0.5 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 0.06 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Penicillins - Ampicillin | 8 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tetracyclines - Tetracycline | 8 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Trimethoprim | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cephalosporins - Ceftazidim | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Polymyxins - Colistin | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sulfonamides - Sulfamethoxazol | 256 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | |
Table Antimicrobial susceptibility testing of S. Braenderup in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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<td>Fluoroquinolones - Ciprofloxacin</td>
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Table Antimicrobial susceptibility testing of *S. enterica* subsp. *diarizonae* in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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<th>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</th>
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<td>Fluoroquinolones - Ciprofloxacin</td>
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<td>Penicillins - Ampicillin</td>
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<td>Trimethoprim</td>
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### Table Antimicrobial susceptibility testing of S. enterica subsp. diarizonae in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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<tr>
<th>Antimicrobials</th>
<th>Other animals - unspecified - Clinical investigations</th>
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<td>Polymyxins - Colistin</td>
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Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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Concentration (µg/ml), number of isolates with a concentration of inhibition equal to:

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Switzerland - 2011 Report on trends and sources of zoonoses
Table Antimicrobial susceptibility testing of Salmonella spp., unspecified in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of *S. enterica* subsp. *houtenae* in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Concentration (µg/ml), number of isolates with a concentration of inhibition equal to
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### Table Antimicrobial susceptibility testing of S. Virchow in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

<p>| Antimicrobials:                      | Cut-off value | N | n | &lt;=0.002 | &lt;=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | &gt;4096 | 1024 | 2048 |
|--------------------------------------|---------------|---|---|---------|---------|-------|-------|-------|------|------|-----|------|-----|----|---|---|---|---|----|----|----|-----|-----|-----|------|-----|-----|
| Aminoglycosides - Gentamicin         | 2             | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Aminoglycosides - Kanamycin          | 8             | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Aminoglycosides - Streptomycin       | 16            | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Amphenicols - Chloramphenicol        | 16            | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Amphenicols - Florfenicol            | 16            | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Cephalosporins - Cefotaxime          | 0.5           | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Fluoroquinolones - Ciprofloxacin     | 0.06          | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Penicillins - Ampicillin             | 8             | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Quinolones - Nalidixic acid          | 16            | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Tetracyclines - Tetracycline         | 8             | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Trimethoprim                          | 2             | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Cephalosporins - Ceftazidim          | 2             | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Polymyxins - Colistin                | 2             | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |
| Sulfonamides - Sulfamethoxazol       | 256           | 1 | 0 |         |         |       |       |       |      |      |     |      |     |    |   |   |   |   |    |    |    |     |     |     |       |     |     |</p>
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### Table Antimicrobial susceptibility testing of S. Infantis in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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Concentration (µg/ml), number of isolates with a concentration of inhibition equal to
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Table Antimicrobial susceptibility testing of *S. Typhimurium* in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

<p>| Antimicrobials                        | Cut-off value | N   | n   | &lt;=0.002 | &lt;=0.004 | 0.008 | 0.015 | 0.016 | 0.03  | 0.06  | 0.12  | 0.25  | 0.5   | 1     | 2     | 4     | 8     | 16    | 32    | 64    | 128   | 256   | 512   | &gt;4096 | 1024  | 2048  |
|--------------------------------------|---------------|-----|-----|---------|----------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Aminoglycosides - Gentamicin         | 2             | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Aminoglycosides - Kanamycin          | 8             | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Aminoglycosides - Streptomycin       | 16            | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Amphenicols - Chloramphenicol        | 16            | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Amphenicols - Florfenicol            | 16            | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Cephalosporins - Cefotaxime          | 0.5           | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Fluoroquinolones - Ciprofloxacin     | 0.06          | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Penicillins - Ampicillin             | 8             | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Quinolones - Nalidixic acid          | 16            | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Tetracyclines - Tetracycline         | 8             | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Trimethoprim                         | 2             | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Cephalosporins - Ceftazidim          | 2             | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Polymyxins - Colistin                | 2             | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| Sulfonamides - Sulfamethoxazol       | 256           | 1   | 0   |         |          |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |</p>
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Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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## Table Antimicrobial susceptibility testing of S. Enteritidis in Cats - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
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<tbody>
<tr>
<td></td>
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<tr>
<td>Aminoglycosides - Gentamicin</td>
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</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
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</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
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</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
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</tr>
<tr>
<td>Amphenicols - Florfenicol</td>
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</tr>
<tr>
<td>Cephalosporins - Cefotaxime</td>
<td>0.06</td>
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<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>0.008</td>
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<tr>
<td>Penicillins - Ampicillin</td>
<td>0.5</td>
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<tr>
<td>Quinolones - Nalidixic acid</td>
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<tr>
<td>Tetracyclines - Tetracycline</td>
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<tr>
<td>Trimethoprim</td>
<td>0.5</td>
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<tr>
<td>Cephalosporins - Ceftazidim</td>
<td>0.25</td>
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<tr>
<td>Polymyxins - Colistin</td>
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<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
<td>8</td>
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</table>
### Table Antimicrobial susceptibility testing of S. Aqua in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
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<th>Other animals - unspecified - Clinical investigations</th>
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<tr>
<td></td>
<td>Cut-off value</td>
<td>N</td>
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<td>1</td>
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<tr>
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<td>1</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Amphenicols - Florfenicol</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Cephalosporins - Cefotaxime</td>
<td>0.5</td>
<td>1</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>0.06</td>
<td>1</td>
</tr>
<tr>
<td>Penicillins - Ampicillin</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Quinolones - Nalidixic acid</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cephalosporins - Ceftazidim</td>
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<td>1</td>
</tr>
<tr>
<td>Polymyxins - Colistin</td>
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</tr>
<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
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<tr>
<td>Antimicrobials:</td>
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<td>Number of isolates available in the laboratory</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------------------------</td>
<td>-----------------------------------------------</td>
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<td>S. Aqua</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>unknown</td>
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### Antimicrobials:

- **Aminoglycosides - Gentamicin**: 0.25–32
- **Aminoglycosides - Kanamycin**: 4–128
- **Aminoglycosides - Streptomycin**: 2–128
- **Amphenicols - Chloramphenicol**: 2–64
- **Amphenicols - Florfenicol**: 2–64
- **Cephalosporins - Cefotaxime**: 0.06–4
- **Fluoroquinolones - Ciprofloxacin**: 0.008–8
- **Penicillins - Ampicillin**: 0.5–32
- **Quinolones - Nalidixic acid**: 4–64
- **Tetracyclines - Tetracycline**: 1–64
- **Trimethoprim**: 0.5–32
- **Cephalosporins - Ceftazidim**: 0.25–16
- **Polymyxins - Colistin**: 2–4
- **Sulfonamides - Sulfamethoxazol**: 8–1024
### Table Antimicrobial susceptibility testing of S. Blijdorp in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

| Antimicrobials:                  | Concentration (µg/ml), number of isolates with a concentration of inhibition equal to | Cut-off value | N  | n  | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 | 1024 | 2048 |
|----------------------------------|--------------------------------------------------------------------------------------|---------------|----|----|---------|---------|-------|-------|-------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Aminoglycosides - Gentamicin     |                                                                                      |               | 2  | 1  | 0      |         |       |       |       | 0.02 | 0.04 | 0.08 | 0.16 | 0.3  | 0.6 | 0.12 | 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Aminoglycosides - Kanamycin      |                                                                                      |               | 8  | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Aminoglycosides - Streptomycin   |                                                                                      |               | 16 | 1  | 1      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Amphenicols - Chloramphenicol    |                                                                                      |               | 16 | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Amphenicols - Florfenicol        |                                                                                      |               | 16 | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Cephalosporins - Cefotaxime      |                                                                                      |               | 0.5| 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Fluoroquinolones - Ciprofloxacin|                                                                                      |               | 0.06| 1 | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Penicillins - Ampicillin         |                                                                                      |               | 8  | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Quinolones - Nalidixic acid      |                                                                                      |               | 16 | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Tetracyclines - Tetracycline     |                                                                                      |               | 8  | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Trimethoprim                     |                                                                                      |               | 2  | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Cephalosporins - Ceftazidim      |                                                                                      |               | 2  | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Polymyxins - Colistin            |                                                                                      |               | 2  | 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
| Sulfonamides - Sulfamethoxazol   |                                                                                      |               | 256| 1  | 0      |         |       |       |       | 0.04 | 0.08 | 0.16 | 0.3  | 0.6  | 0.12| 0.25 | 0.5  | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | >256 |
Table Antimicrobial susceptibility testing of S. Blijdorp in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>S. Blijdorp</th>
<th>Other animals - unspecified - Clinical investigations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Isolates out of a monitoring program (yes/no)</td>
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</tr>
<tr>
<td></td>
<td>Number of isolates available in the laboratory</td>
<td>unknown</td>
</tr>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>0.25</td>
<td>32</td>
</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
<td>4</td>
<td>128</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>2</td>
<td>128</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>Amphenicols - Florfenicol</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>Cephalosporins - Cefotaxime</td>
<td>0.06</td>
<td>4</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>0.008</td>
<td>8</td>
</tr>
<tr>
<td>Penicillins - Ampicillin</td>
<td>0.5</td>
<td>32</td>
</tr>
<tr>
<td>Quinolones - Nalidixic acid</td>
<td>4</td>
<td>64</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
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<td>64</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>0.5</td>
<td>32</td>
</tr>
<tr>
<td>Cephalosporins - Ceftazidim</td>
<td>0.25</td>
<td>16</td>
</tr>
<tr>
<td>Polymyxins - Colistin</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
<td>8</td>
<td>1024</td>
</tr>
</tbody>
</table>
Table Antimicrobial susceptibility testing of S. Thompson in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</th>
</tr>
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<tbody>
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<td>Aminoglycosides</td>
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<td></td>
<td>2</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Kanamycin</td>
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<tr>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Streptomycin</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Amphenicols</td>
<td>Chloramphenicol</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Amphenicols</td>
<td>Florfenicol</td>
</tr>
<tr>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Cephalosporins</td>
<td>Cefotaxime</td>
</tr>
<tr>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>Ciprofloxacin</td>
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<td></td>
<td>0.06</td>
</tr>
<tr>
<td>Penicillins</td>
<td>Ampicillin</td>
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<tr>
<td></td>
<td>8</td>
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<tr>
<td>Quinolones</td>
<td>Nalidixic acid</td>
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<td></td>
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<td>Tetracyclines</td>
<td>Tetracycline</td>
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<td>8</td>
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<tr>
<td>Trimethoprim</td>
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<td>Polymyxins</td>
<td>Colistin</td>
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<td>Sulfonamides</td>
<td>Sulfamethoxazol</td>
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<tr>
<td></td>
<td>256</td>
</tr>
</tbody>
</table>

| Cut-off value  | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 |
|----------------|---|---|---------|---------|-------|-------|-------|------|------|------|------|-----|----|---|---|---|---|---|---|---|----|----|----|-----|-----|-----|-----|
| Aminoglycosides|   |   |         |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Gentamicin     | 2 | 1 | 0       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Kanamycin      | 8 | 1 | 0       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Streptomycin   | 16| 1 | 0       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Chloramphenicol| 16| 1 | 0       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Florfenicol    | 16| 1 | 0       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Cefotaxime     | 0.5| 1 | 1       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Ciprofloxacin  | 0.06| 1 | 0       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Ampicillin     | 8 | 1 | 1       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Nalidixic acid | 16| 1 | 0       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Tetracycline   | 8 | 1 | 1       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Ceftazidim     | 2 | 1 | 1       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Colistin       | 2 | 1 | 1       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
| Sulfamethoxazol| 256| 1 | 1       |         |       |       |       |      |      |      |      |     |    |   |   |   |   |   |   |   |    |    |    |     |     |     |     |
# Table Antimicrobial susceptibility testing of S. Thompson in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Other animals - unspecified - Clinical investigations</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Isolates out of a monitoring program (yes/no)</td>
</tr>
<tr>
<td></td>
<td>Number of isolates available in the laboratory</td>
</tr>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Antimicrobials</th>
<th>lowest</th>
<th>highest</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>0.25</td>
<td>32</td>
</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
<td>4</td>
<td>128</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
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<td>64</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>0.5</td>
<td>32</td>
</tr>
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<td>0.25</td>
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<tr>
<td>Polymyxins - Colistin</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
<td>8</td>
<td>1024</td>
</tr>
</tbody>
</table>
Table Antimicrobial susceptibility testing of *S. enterica* subsp. *diarizonae* in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>S. enterica subsp. diarizonae</th>
<th>Sheep - unspecified - Clinical Investigations</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</td>
</tr>
</tbody>
</table>

### Antimicrobials:

**Cut-off values**

| Concentration (µg/ml) | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >1024 | 2048 |
|------------------------|---|---|---------|---------|-------|-------|-------|------|------|------|------|-----|----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Aminoglycosides - Gentamicin** | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Aminoglycosides - Kanamycin** | 8 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Aminoglycosides - Streptomycin** | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Amphenicols - Chloramphenicol** | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Amphenicols - Florfenicol** | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Cephalosporins - Cefotaxime** | 0.5 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Fluoroquinolones - Ciprofloxacin** | 0.06 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Penicillins - Ampicillin** | 8 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Quinolones - Nalidixic acid** | 16 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Tetracyclines - Tetracycline** | 8 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Trimethoprim** | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Cephalosporins - Ceftazidim** | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Polymyxins - Colistin** | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
| **Sulfonamides - Sulfamethoxazol** | 256 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | | |
### Table Antimicrobial susceptibility testing of *S. enterica* subsp. *diarizonae* in Sheep - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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# Table Antimicrobial susceptibility testing of S. Veneziana in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Veneziana in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Gaminara in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Typhimurium in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Concentration (µg/ml), number of isolates with a concentration of inhibition equal to
### Table Antimicrobial susceptibility testing of S. Typhimurium in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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<th>Number of isolates available in the laboratory</th>
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Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Typhimurium in Cattle (bovine animals) - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]
### Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - unspecified - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Typhimurium in Pigs - unspecified - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Enteritidis in Birds - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Enteritidis in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Enteritidis in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - environmental sample - quantitative data [Dilution method]

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<th>Number of isolates available in the laboratory</th>
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### Table Antimicrobial susceptibility testing of S. Muenchen in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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**Note:** Concentration (µg/ml), number of isolates with a concentration of inhibition equal to or less than the cut-off value.
### Table Antimicrobial susceptibility testing of S. Muenchen in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Beaudesert in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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Note: Table represents the concentration (µg/ml), number of isolates with a concentration of inhibition equal to the cut-off value.
### Table Antimicrobial susceptibility testing of S. Beaudesert in Other animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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### Table Antimicrobial susceptibility testing of S. Newport in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]

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Table Antimicrobial susceptibility testing of S. Newport in Dogs - pet animals - unspecified - Clinical investigations - Unspecified - Not applicable - animal sample - faeces - quantitative data [Dilution method]
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<th>Concentration (microg/ml)</th>
<th>Zone diameter (mm)</th>
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### Table Cut-off values for antibiotic resistance testing of Salmonella in Feed

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# Table Cut-off values for antibiotic resistance testing of Salmonella in Food

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<tr>
<td>Sulfonamides</td>
<td>Sulfonamides</td>
<td>NON-EFSA</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>Tetracycline</td>
<td>NON-EFSA</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>Trimethoprim</td>
<td>NON-EFSA</td>
</tr>
</tbody>
</table>
2.2 CAMPYLOBACTERIOSIS

2.2.1 General evaluation of the national situation

A. Thermophilic Campylobacter general evaluation

History of the disease and/or infection in the country

Campylobacteriosis in humans is a notifiable disease. Laboratories have to report cases within one week of Campylobacter spp. being detected (ordinance of the FDHA on medical doctor and laboratory reporting). In the 80s campylobacteriosis was the second most reported food borne disease in humans. Increasing every year it overtook salmonellosis in 1995. Since then campylobacteriosis is the main food-associated infection in Switzerland. After reaching a peak in 2000 with 105,1 reports per 100,000 inhabitants the incidence declined steadily until 2005, but always remained over 70 reports per 100,000 inhabitants. From 2005 until 2009 campylobacteriosis cases rose again to up to 100,1 reports per 100,000 inhabitants. C. jejuni has always been the most isolated serovar in humans.

In a study conducted in 2007, the prevalence of Campylobacter in poultry meat was 43.7%. A cross-sectional study in broiler meat at retail was conducted from April 2009 to April 2010 showed a slightly decrease to 38.4%. In both studies it could be shown that frozen products and products without skin have a smaller risk to be contaminated with Campylobacter than fresh products and products with skin. Campylobacteriosis is an animal disease to be monitored (TSV, Article 5), i.e. the suspicion of occurrence of such a disease must be reported to the cantonal veterinarian. In general, campylobacteriosis cases reported to the FVO by cantonal veterinarians in animals are low because infected animals usually don’t get ill. In the last 10 years (2002-2011) 93 campylobacteriosis cases were reported, 90% of which occurred in pets (dogs and cats) and 10% in livestock (cattle and sheep).

As poultry represents an important reservoir of Campylobacter, the occurrence of Campylobacter spp. in broiler chicken farms has been studied since 2002 as part of the monitoring programme on antimicrobial resistance. In 2008 the baseline study on the prevalence and antimicrobial resistance of Campylobacter spp. in broiler flocks and on the prevalence of Campylobacter spp. and Salmonella spp. in broiler carcasses was carried out. This baseline study showed a prevalence of 46.8% positive broiler flocks in the period May 2008 to April 2009 (60% from May 2008 to December 2008) and a prevalence of Campylobacter in broiler carcasses of 70.6% (cumulated qualitative and quantitative approach). The Campylobacter prevalence in broiler herds for the entire 2009 (from January to December) came to 44%.

A survey conducted in 2006 in calves revealed a Campylobacter prevalence of 40.4%. In the framework of the antimicrobial resistance monitoring 2010 a marked decrease could be observed: The prevalence in calves was 15% with 25 C. jejuni and 12 C. coli isolated from 245 samples.

National evaluation of the recent situation, the trends and sources of infection

Compared to 2010 with 6610 cases of campylobacteriosis, the number of campylobacteriosis cases increased in 2011 to 7964, which corresponds with an incidence rate of 101 per 100'000 inhabitants (2010: 84/100'000). This is the highest rate of new infections since the introduction of compulsory registration. Similar to previous years the most affected age groups were babies under one year of age (131/100'000) and young adults aged 15 to 24 years (147/100'000). Most notifications were registered in August and December. In concordance with other years, most cases were caused by C. jejuni (63% of all cases, whereat in 26% of cases no distinction was made between C. jejuni and C. coli).
In animals, 10 cases (8 in dogs, 1 in cats and 1 in cattle) of campylobacteriosis were reported to the FVO by cantonal veterinarians in 2011. The notification rate was similar to previous years. Furthermore, in veterinary diagnostic laboratories 2612 tests for campylobacteriosis were carried out in the context of clinical investigations, mainly in dogs and cats.

Campylobacter is one of the main bacteria in the antimicrobial resistance monitoring programme. A random sample of broilers and pigs was investigated at slaughter using cloacal and faecal swabs. The samples are taken evenly distributed throughout the year, in order to exclude seasonal effects. 2011, 445 broiler herds were tested, of which 166 (37.3%) were Campylobacter positive (156x C. jejuni and 10x C. coli). Compared to 2010 (with 33% positive herds) the prevalence increased, but did not reach the level of 2009 with 44%.

The Campylobacter prevalence in pigs remained stable also in 2011. 189 from 287 sampled pigs (66%) were found to be Campylobacter positive 66%. Only C. coli strains were isolated.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Campylobacteriosis occurs most commonly in young adults (20-29 years). Like in the years before, in 2011 the incidences were highest in infants under one year of age and in young adults aged 15-24 years. Typically, infections above average occur in summer (July/August) and to a lesser extend at the beginning of the year (December/January). It is assumed that the high rate of disease in young adults is attributable to increased travel and less regard for kitchen hygiene at this age. Therefore, travelling abroad as well as consumption of poultry meat and poultry liver are expected to be the most likely risk factors in humans for campylobacteriosis in Switzerland, whereas cattle and pets seem to be less important.

Recent actions taken to control the zoonoses

In 2009 Switzerland formed a so called Campylobacter-platform with stakeholders of the poultry industry, researchers and national and cantonal authorities, all of them concerned by increasingly high incidence of human campylobacteriosis, high prevalence in broiler flocks and absence of efficient control measures. The aim of the Campylobacter-platform is to contribute to a substantial decrease of campylobacteriosis in humans. Information exchange, coordination and evaluation of control measures, identification of gaps of knowledge and initialization of applied research projects are the main tasks of the Campylobacter-platform. The focus is on the three topics risk factors for human infection, Campylobacter safe broiler production and disease awareness along the food chain.

Additional information
1. The industry takes responsibility for the monitoring of broilers and poultry meat production in a system of self-auditing. More information can be found in the relevant chapters.
2. Further information can be found on the FVO website www.bvet.admin.ch.
### 2.2.2 Campylobacteriosis in humans

Table Campylobacter in humans - Species/serotype distribution

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases</th>
<th>Cases Inc.</th>
<th>Autochthon cases</th>
<th>Autochthon Inc.</th>
<th>Imported cases</th>
<th>Imported Inc.</th>
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<td>0</td>
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<td>C. jejuni</td>
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<th></th>
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<tr>
<td></td>
<td>All</td>
<td>M</td>
<td>F</td>
<td>All</td>
<td>M</td>
<td>F</td>
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<td>1</td>
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<td>38</td>
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<td>103</td>
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<td>119</td>
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<td>65 years and older</td>
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<td>810</td>
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<td>2710</td>
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## Table Campylobacter in humans - Seasonal distribution

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<tr>
<th>Seasonal Distribution</th>
<th>C. coli</th>
<th>C. jejuni</th>
<th>C. upsaliensis</th>
<th>Campylobacter spp., unspecified</th>
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</thead>
<tbody>
<tr>
<td>Months</td>
<td>Cases</td>
<td>Cases</td>
<td>Cases</td>
<td>Cases</td>
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<td>February</td>
<td>14</td>
<td>169</td>
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<tr>
<td>March</td>
<td>13</td>
<td>199</td>
<td>392</td>
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</tr>
<tr>
<td>April</td>
<td>9</td>
<td>201</td>
<td>356</td>
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<td>May</td>
<td>29</td>
<td>325</td>
<td>640</td>
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</tr>
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<td>June</td>
<td>17</td>
<td>463</td>
<td>863</td>
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<td>July</td>
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<td>940</td>
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<td>August</td>
<td>54</td>
<td>718</td>
<td>1048</td>
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<td>September</td>
<td>32</td>
<td>478</td>
<td>682</td>
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<tr>
<td>October</td>
<td>29</td>
<td>479</td>
<td>672</td>
<td></td>
</tr>
<tr>
<td>November</td>
<td>21</td>
<td>398</td>
<td>567</td>
<td></td>
</tr>
<tr>
<td>December</td>
<td>28</td>
<td>709</td>
<td>940</td>
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<tr>
<td>Total :</td>
<td>302</td>
<td>5052</td>
<td>1</td>
<td>7964</td>
</tr>
</tbody>
</table>
2.2.3 Campylobacter in foodstuffs

A. Thermophilic Campylobacter in Broiler meat and products thereof

Results of the investigation

Additional information
1. The industry takes responsibility for the monitoring of poultry meat production in a system of self-auditing following the HACCP principles. Results of the Campylobacter monitoring of the largest poultry producers and abattoirs are available covering more than 92% of the production. Samples are taken several times a year at random. Fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see Campylobacter poultry meat table). 380 of 1286 (29.5%) broiler meat samples tested positive. No imported meat samples were included.
2. Further information can be found on the FVO website www.bvet.admin.ch.
Results of the investigation

1. The industry takes responsibility for the monitoring of poultry meat production in a system of self-auditing following the HACCP principles. Results of the Campylobacter monitoring of the largest poultry producers and abattoirs are available covering more than 92% of the production. Samples are taken several times a year at random. Fresh poultry meat, poultry meat preparations and poultry meat products were tested at different stages such as slaughterhouse, cutting plant and processing plant (see Campylobacter poultry meat table). In total 14 of 67 (21%) meat samples from fattening turkeys tested positive. No imported meat samples were included.

2. Further information can be found on the FVO website www.bvet.admin.ch.
<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Campylobacter</th>
<th>C. coli</th>
<th>C. jejuni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat from broilers (Gallus gallus) - fresh - at cutting plant - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Single</td>
<td>10g/25g</td>
<td>146</td>
<td>94</td>
<td>9</td>
<td>57</td>
</tr>
<tr>
<td>Meat from broilers (Gallus gallus) - fresh - at cutting plant - imported - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Single</td>
<td>10g</td>
<td>166</td>
<td>125</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Single</td>
<td>10g/25g</td>
<td>239</td>
<td>84</td>
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</tr>
<tr>
<td>Meat from broilers (Gallus gallus) - fresh - at processing plant - imported - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Single</td>
<td>10g/25g</td>
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<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
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<td>10g</td>
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<td>Industry sampling</td>
<td>food sample</td>
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<td>10g/25g</td>
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<tr>
<td>Meat from broilers (Gallus gallus) - meat preparation - at processing plant - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Single</td>
<td>10g/25g</td>
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<tr>
<td>Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Single</td>
<td>25g</td>
<td>1</td>
<td>0</td>
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<td>Meat from broilers (Gallus gallus) - meat products - cooked, ready-to-eat - at processing plant - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Batch</td>
<td>25g</td>
<td>398</td>
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### Table Campylobacter in poultry meat

<table>
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<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Campylobacter</th>
<th>C. coli</th>
<th>C. jejuni</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
<td>Single</td>
<td>10g</td>
<td>48</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)</td>
<td>poultry industry</td>
<td>Unspecified</td>
<td>Industry sampling</td>
<td>food sample</td>
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<td>10g</td>
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<td>9</td>
<td>1</td>
<td>7</td>
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<td>food sample</td>
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<td>10g</td>
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<td>Meat from turkey - fresh - at processing plant - imported - Surveillance (HACCP and own checks)</td>
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<td>food sample</td>
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<td>10g/25g</td>
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<td>food sample</td>
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<table>
<thead>
<tr>
<th>C. lari</th>
<th>C. upsaliensis</th>
<th>Thermophilic Campylobacter spp., unspecified</th>
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<tr>
<td>Meat from broilers (Gallus gallus) - fresh - at processing plant - Surveillance (HACCP and own checks)</td>
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<td>84</td>
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<tr>
<td>Meat from broilers (Gallus gallus) - fresh - at processing plant - imported - Surveillance (HACCP and own checks)</td>
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<td>Meat from broilers (Gallus gallus) - minced meat - at processing plant - Surveillance (HACCP and own checks)</td>
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<td>Meat from turkey - fresh - at cutting plant - Surveillance (HACCP and own checks)</td>
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## Table Campylobacter in poultry meat

<table>
<thead>
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<th>Thermophilic Campylobacter spp., unspecified</th>
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</thead>
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<td>Meat from turkey - fresh - at processing plant - imported - Surveillance (HACCP and own checks)</td>
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<td>Meat from turkey - meat preparation - at processing plant - Surveillance (HACCP and own checks)</td>
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</tbody>
</table>
2.2.4 Campylobacter in animals

A. Thermophilic Campylobacter in Gallus gallus

Monitoring system

Sampling strategy

A random sample of 445 broiler herds is investigated at slaughter using cloacal swabs (5 swabs pooled per herd). The samples are taken evenly distributed throughout the year, in order to exclude seasonal effects. The broiler slaughter plants included in the surveillance programme account for 92% of the total production of broilers in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. Each sample represents one herd. The samples were taken in the framework of the antimicrobial resistance monitoring and the number of samples taken should provide at least 170 isolates for the susceptibility testing.

Frequency of the sampling

At slaughter
Sampling distributed evenly throughout the year

Type of specimen taken

At slaughter
cloacal swabs

Methods of sampling (description of sampling techniques)

At slaughter
In total 5 cloacal swabs (one each from 5 different broilers) per slaughter batch were taken. The samples were taken using a swab in standard transportation medium (Transport swabs, Oxoid TS0001A, Amies W/O CH). Immediately after collection the samples were sent to the laboratory for analysis.

Case definition

At slaughter
Herds tested positive for C. jejuni or C. coli.

Diagnostic/analytical methods used

At slaughter
Bacteriological method: At the laboratory, cloacal swabs were pooled and direct culture was carried out on a selective medium suitable for Campylobacter (m CCDA). Identification of Campylobacter was carried out according to ISO 10272-1: 2006 (interpretation of gram staining, oxidase-katalase-tests and hippurat- and indoxylacetate-hydrolysis).

Vaccination policy

No vaccination available.

Other preventive measures than vaccination in place

The poultry industry encourages farmers to lower the Campylobacter burden by offering incentives for negative herds at slaughter. No immunoprophylactic methods are allowed.

Measures in case of the positive findings or single cases
Notification system in place

Campylobacteriosis (but not an infection with Campylobacter) in animals is notifiable (TSV, Art.5).

Results of the investigation

In 2011, 37.3% of the 445 sampled broiler flocks were positive for Campylobacter, 156 isolates of C. jejuni and 10 C. coli were identified.

National evaluation of the recent situation, the trends and sources of infection

The prevalence of Campylobacter in broiler flocks slightly increased from 33% in 2010 to 37.3% in 2011.

Additional information

Further information can be found on the OVF website www.bvet.admin.ch.
Monitoring system

Sampling strategy
A random sample of 287 pigs is investigated at slaughter using faecal swabs in 2011. The samples are taken evenly distributed throughout the year, in order to exclude seasonal effects. The pig slaughter plants included in the surveillance programme account for >85% of the total production of pigs in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. The samples were taken in the framework of the antimicrobial resistance monitoring and the number of samples taken should provide at least 170 isolates for the susceptibility testing.

Frequency of the sampling
6 samples per week.

Type of specimen taken
Faeces

Methods of sampling (description of sampling techniques)
The samples were taken rectally using a swab in standard transportation medium (Transport swabs, Oxoid TS0001A, Amies W/O CH). Immediately after collection the samples were sent to the laboratory for analysis.

Case definition
Samples tested positive for C. jejuni or C. coli.

Diagnostic/analytical methods used
At the laboratory, samples were cultured within 72h after sampling with direct cultivation on selective culture media (m CCDA). Identification of Campylobacter was carried out according to ISO 10272-1: 2006.

Vaccination policy
No vaccination available.

Other preventive measures than vaccination in place
--

Measures in case of the positive findings or single cases
No measures are taken.

Notification system in place
Campylobacteriosis (but not an infection with Campylobacter) in animals is notifiable (TSV, Art.5).

Results of the investigation
In 287 sampled pigs the prevalence of Campylobacter was 66%, 189 C. coli strains were isolated.

National evaluation of the recent situation, the trends and sources of infection
C. coli is prevalent in most swine holdings. As Campylobacter doesn’t survive on the surface of swine carcass due to drying process, this finding is not very meaningful for public health.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)
Additional information

Further information can be found on the FVO website www.bvet.admin.ch.
## Table Campylobacter in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Units tested</th>
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<td>Official sampling</td>
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1) Objective sampling
2) Official sampling
# Table Campylobacter in animals

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</table>

**Comments:**

1) Data originate from the antimicrobial resistance monitoring.
### Table Campylobacter in animals

**Comments:**

2) Data originate from the antimicrobial resistance monitoring.

**Footnote:**

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".
2.2.5 Antimicrobial resistance in Campylobacter isolates

A. Antimicrobial resistance in Campylobacter jejuni and coli in pigs

Sampling strategy used in monitoring

Frequency of the sampling
Sampling in the framework of a monitoring programme on antimicrobial resistance in food-producing animals. In total 287 faecal samples were evenly collected throughout the year. The pig slaughter plants included in the surveillance programme account for > 85% of the total production of pigs in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. The number of samples taken should provide at least 170 isolates for the susceptibility testing.

Type of specimen taken
Faecal samples.

Methods of sampling (description of sampling techniques)
At slaughter: The samples were taken rectally using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were sent to the laboratory for analysis.

Procedures for the selection of isolates for antimicrobial testing
From each sample and campylobacter subtype one isolate was submitted to susceptibility testing.

Methods used for collecting data
All samples were analyzed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates
Samples were cultured for Campylobacter spp. within 72 h after sampling using standard microbiological procedures with direct cultivation on selective culture media. Identification of Campylobacter was carried out according to ISO 10272-1: 2006.

Laboratory used for detection for resistance
Antimicrobials included in monitoring
chloramphenicol, ciprofloxacin, erythromycin, gentamicin, nalidixic acid, streptomycin, tetracycline

Cut-off values used in testing
Resistance was defined following the epidemiological cut-off values published by the Europaean Committee on Antimicrobial Susceptibility Testing (EUCAST).

Preventive measures in place
No specific preventive measures for antimicrobial resistance in campylobacter. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Measures in case of the positive findings or single cases
None

Notification system in place
Results of the investigation
185 C. coli isolates from fattening pigs were subjected to susceptibility testing. The highest proportions of resistant isolates were found against streptomycin (73%). High levels of resistance were also found against ciprofloxacin (40.5%), nalidixic acid (41.1%) and tetracycline (29.7%). 14.6% of the C. coli isolates were fully sensitive to all tested antimicrobials, 2.2% showed resistance against more than four antimicrobials.

National evaluation of the recent situation, the trends and sources of infection
Prevalence of resistance is very high for streptomycin and high for tetracycline and ciprofloxacin. The prevalence of resistance for ciprofloxacin slightly increased over the last years. The occurrence of resistances to erythromycin and gentamicin are low to very low and stayed stable for C. coli in pigs.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)
Consumption of pork amounted to 24.9 kg per person in the year 2011. This corresponds to 39.8% of the total meat consumption. Even though the relevance of campylobacter is substantially reduced during the meat processing, pork can not be neglected as a source of resistant campylobacter for humans. The large percentage of isolates resistant to fluoroquinolones, macrolides is of concern, because these antimicrobials are used to treat human campylobacter infections.

Additional information
Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
B. Antimicrobial resistance in Campylobacter jejuni and coli in poultry

Sampling strategy used in monitoring

Frequency of the sampling

Sampling in the framework of a monitoring programme on antimicrobial resistance in food-producing animals. In total cloacal swabs (5 from each batch) from 445 slaughter batches were collected evenly throughout the year. The broiler slaughter plants included in the surveillance programme account for > 92% of the total production of broilers in Switzerland. The number of samples for each plant has been determined in proportion to the number of broilers slaughtered per year. Each sample represents one herd. The number of samples taken should provide at least 170 isolates for the susceptibility testing.

Type of specimen taken

Cloacal swabs

Methods of sampling (description of sampling techniques)

In total 5 cloacal swabs (from 5 different broilers) per slaughter batch were collected using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were sent to the laboratory for pooling and analysis.

Procedures for the selection of isolates for antimicrobial testing

From each sampled slaughter batch and campylobacter subtype, one isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured for Campylobacter spp. within 72 h after sampling using standard microbiological procedures with direct cultivation on selective culture media. Identification of Campylobacter was carried out according to ISO 10272-1: 2006.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

chloramphenicol, ciprofloxacin, erythromycin, gentamicin, nalidixic acid, streptomycin, tetracycline

Cut-off values used in testing

Resistance was defined following the epidemiological cut-off values published by the European Committee on Antimicrobial Susceptibility Testing (EUCAST).

Preventive measures in place

No specific preventive measures for antimicrobial resistance in campylobacter. General preventive measures include education of veterinarians and farmers, disease eradication programmes, incentives for good farming practice and limitation of use of antimicrobials to veterinary prescription.

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

150 C. jejuni and 10 C. coli isolates from broilers were subjected to susceptibility testing.
The highest proportions of resistant isolates for both species were found against ciprofloxacin, nalidixic acid and tetracycline. For C. coli additionally high levels of resistance against streptomycin could be detected. 47.3 % of the C. jejuni isolates and 50 % of the C. coli isolates were fully sensitive to all tested antimicrobials.

National evaluation of the recent situation, the trends and sources of infection

Resistance in campylobacter from poultry has been monitored in Switzerland since 2002. Prevalence of resistance is constantly low for gentamicin and erythromycin in C. jejuni. The prevalence of resistance to ciprofloxacin significantly increased from about 15% in 2006 to over 40% in C. jejuni. The Number of C. coli isolates is too small to be able to make conclusions on trends.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Consumption of poultry meat was 11.4 kg per person in 2010 which corresponds to 18.3% of total meat consumption. About 50% of the poultry meat consumed in Switzerland is imported. Campylobacter survives well in poultry meat, therefore broilers are an important source of human infection with Campylobacter jejuni. It is thus important for public health to maintain a favorable resistance situation in campylobacter in broilers. The increase of resistances against ciprofloxacin gives cause for certain concern because quinolones are on the WHO list of critically important antimicrobials and are a preferred empiric treatment for gastrointestinal diseases.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
### Table Antimicrobial susceptibility testing of *C. jejuni* in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

<p>| Antimicrobials | Cut-off value | N  | n  | &lt;=0.002 | &lt;=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | &gt;50 | &gt;1024| &gt;2048 |
|----------------|--------------|----|----|---------|---------|-------|-------|-------|-----|-----|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Aminoglycosides - Gentamicin | 1 | 150 | 2 | 81 | 59 | 8 | | | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Streptomycin | 2 | 150 | 14 | 132 | 4 | 2 | 12 | | | | | | | | | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 150 | 1 | 42 | 81 | 19 | 7 | 1 | | | | | | | | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 1 | 150 | 61 | 18 | 48 | 21 | 2 | 61 | | | | | | | | | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 16 | 150 | 63 | 25 | 44 | 18 | 1 | 62 | | | | | | | | | | | | | | | | | | | | |
| Tetracyclines - Tetracycline | 2 | 150 | 31 | 53 | 42 | 20 | 4 | 2 | 29 | | | | | | | | | | | | | | | | | | | | |
| Macrolides - Erythromycin | 4 | 150 | 8 | 53 | 31 | 41 | 17 | 3 | 2 | 3 | | | | | | | | | | | | | | | | | | | | ||</p>
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<td>Macrolides - Erythromycin</td>
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Table Antimicrobial susceptibility testing of *C. coli* in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

| Antimicrobials: | Cut-off value | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >2048 |
|-----------------|--------------|---|---|---------|---------|------|------|------|------|------|------|------|-----|----|---|---|---|---|---|---|---|---|---|----|---|
| Aminoglycosides - Gentamicin | 2 | 10 | 1 | 7 | 2 | 1 |  | | | | | | | | | | | | | | | | | | |
| Aminoglycosides - Streptomycin | 4 | 10 | 4 | 5 |  |  | 2 |  | | | | | | | | | | | | | | | | | |
| Amphenicols - Chloramphenicol | 16 | 10 | 0 | | | | | 4 | 5 | 1 |  | | | | | | | | | | | | | |
| Fluoroquinolones - Ciprofloxacin | 1 | 10 | 2 | 5 | 3 |  | | | | | | | | | | | | | | | | | | |
| Quinolones - Nalidixic acid | 32 | 10 | 2 | | | | | 4 | 3 | 1 | 2 |  | | | | | | | | | | | |
| Tetracyclines - Tetracycline | 2 | 10 | 3 | | | | | 1 | 4 | 1 | 1 | 3 |  | | | | | | | | | | |
| Macrolides - Erythromycin | 16 | 10 | 0 | | | | | 3 | 2 | 1 | 3 | 1 |  | | | | | | | | | | |

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
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### Table Antimicrobial susceptibility testing of C. coli in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

<table>
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<tr>
<th>Antimicrobials:</th>
<th>C. coli</th>
<th>Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications</th>
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<td>Number of isolates available in the laboratory</td>
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<td>yes/no</td>
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<td>16</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
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### Table Antimicrobial susceptibility testing of C. coli in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Isolates out of a monitoring program (yes/no)</th>
<th>Number of isolates available in the laboratory</th>
<th>Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>C. coli</td>
<td></td>
<td>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>C. coli</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimicrobials:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>2</td>
<td>185</td>
<td>2</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>4</td>
<td>136</td>
<td>2</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>16</td>
<td>77</td>
<td>2</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>1</td>
<td>76</td>
<td>1</td>
</tr>
<tr>
<td>Quinolones - Nalidixic acid</td>
<td>32</td>
<td>145</td>
<td>2</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>2</td>
<td>145</td>
<td>2</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>16</td>
<td>145</td>
<td>2</td>
</tr>
</tbody>
</table>

**Antimicrobials:**

- **Aminoglycosides - Gentamicin**
  - Isolates: 2
  - Concentration: 24, 103, 53, 3
  - Number: 2
- **Aminoglycosides - Streptomycin**
  - Isolates: 4
  - Concentration: 42, 5, 2, 3, 133
  - Number: 185
- **Amphenicols - Chloramphenicol**
  - Isolates: 16
  - Concentration: 20, 96, 62, 5, 2
  - Number: 185
- **Fluoroquinolones - Ciprofloxacin**
  - Isolates: 1
  - Concentration: 35, 51, 21, 2
  - Number: 185
- **Quinolones - Nalidixic acid**
  - Isolates: 32
  - Concentration: 4, 46, 51, 4, 3
  - Number: 185
- **Tetracyclines - Tetracycline**
  - Isolates: 2
  - Concentration: 32, 48, 38, 11, 3, 3, 50
  - Number: 185
- **Macrolides - Erythromycin**
  - Isolates: 16
  - Concentration: 25, 26, 66, 48, 6
  - Number: 185
<table>
<thead>
<tr>
<th>Antimicrobials</th>
<th>Isolates out of a monitoring program (yes/no)</th>
<th>Number of isolates available in the laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>C. coli</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>0.25 - 16</td>
<td></td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>0.5 - 32</td>
<td></td>
</tr>
</tbody>
</table>
### Table Cut-off values used for antimicrobial susceptibility testing of *C. coli* in Animals

<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration (microg/ml)</td>
</tr>
<tr>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td><strong>Aminoglycosides</strong></td>
<td>Gentamicin</td>
</tr>
<tr>
<td></td>
<td>Streptomycin</td>
</tr>
<tr>
<td><strong>Fluoroquinolones</strong></td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td><strong>Macrolides</strong></td>
<td>Erythromycin</td>
</tr>
<tr>
<td><strong>Tetracyclines</strong></td>
<td>Tetracycline</td>
</tr>
</tbody>
</table>
Table: Cut-off values used for antimicrobial susceptibility testing of C. coli in Feed

<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration (microg/ml)</td>
</tr>
<tr>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Gentamicin</td>
</tr>
<tr>
<td></td>
<td>Streptomycin</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Macrolides</td>
<td>Erythromycin</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>Tetracycline</td>
</tr>
</tbody>
</table>
### Table: Cut-off values used for antimicrobial susceptibility testing of C. coli in Food

<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration (microg/ml)</td>
</tr>
<tr>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Gentamicin</td>
</tr>
<tr>
<td></td>
<td>Streptomycin</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Macrolides</td>
<td>Erythromycin</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>Tetracycline</td>
</tr>
</tbody>
</table>
## Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Animals

<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoglycosides</td>
<td>Gentamicin</td>
</tr>
<tr>
<td></td>
<td>Streptomycin</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Macrolides</td>
<td>Erythromycin</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>Tetracycline</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concentration (microg/ml)</th>
<th>Zone diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Resistant &gt;</td>
</tr>
<tr>
<td></td>
<td>Resistant &lt;=</td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
### Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Feed

<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Concentration (microg/ml)</th>
<th>Zone diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard</td>
<td>Resistant &gt;</td>
</tr>
<tr>
<td><strong>Aminoglycosides</strong></td>
<td>Gentamicin</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Streptomycin</td>
<td>2</td>
</tr>
<tr>
<td><strong>Fluoroquinolones</strong></td>
<td>Ciprofloxacin</td>
<td>1</td>
</tr>
<tr>
<td><strong>Macrolides</strong></td>
<td>Erythromycin</td>
<td>4</td>
</tr>
<tr>
<td><strong>Tetracyclines</strong></td>
<td>Tetracycline</td>
<td>2</td>
</tr>
</tbody>
</table>
### Table Cut-off values used for antimicrobial susceptibility testing of C. jejuni in Food

<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration (microg/ml)</td>
</tr>
<tr>
<td></td>
<td>Zone diameter (mm)</td>
</tr>
<tr>
<td></td>
<td>Standard</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Gentamicin</td>
</tr>
<tr>
<td></td>
<td>Streptomycin</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Macrolides</td>
<td>Erythromycin</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>Tetracycline</td>
</tr>
</tbody>
</table>
2.3 LISTERIOSIS

2.3.1 General evaluation of the national situation

A. Listeriosis general evaluation

History of the disease and/or infection in the country

Listeriosis in humans is a notifiable disease. The laboratory must report it within one week of detecting Listeria monocytogenes (ordinance of the FDHA on doctor and laboratory reports) to the Federal Office of Public Health.

The biggest epidemic outbreak in Switzerland was in the 1980s due to contaminated cheese of a particular variety. The first cases of this outbreak were diagnosed in 1983. However, the epidemic pattern and the cause of the infection was a long time not identified because the disease was not notifiable to that time. No more than in 1986 the contaminated cheese was identified as a source of infection. To that time 122 people diseased and 33 died.

In the 1990s human listeriosis cases fluctuated between 19 (in 1990) and 45 (in 1998) cases per year. Since 2000, cases per year are still unstable and compared to the 1990s noticeably higher with cases between 28 (in 2002) and 76 (in 2006). In the years 2005 and 2006 there was a remarkable increase in listeriosis cases with more than 70 cases in these years.

In 2005, the elevated number of cases was partly due to an outbreak with a particular cheese contaminated with Listeria monocytogenes (serotyp 1/2a). The increased number of cases in 2006 could not be linked to a particular outbreak. After 2005 and 2006 the number of cases decreased 2007 to the level of 2004 with roughly 60 cases. In 2008, it declined further to 45 reported cases. The incidence decreased thus from 1.0 in 2006 to 0.8 in 2007 and 0.6 in 2008 per 100,000 inhabitants. The people mainly affected are children less than one year old and people aged over 60.

The surveillance of Listeria monocytogenes that had been conducted within the framework of the national testing programme in the dairy industry by official food control was not continued in 2011. From 2002 onwards several hundred samples of semi-hard and soft-cheese from either raw or pasteurized cow’s, sheep’s and goat’s milk were tested every year for Listeria. Only a few samples were positive each year.

A Listeria Monitoring Programme (LMP) that was set up by the research institute of Agroscope Liebefeld-Posieux (ALP) in 2007 focuses on the identification of contaminants in the dairy industry. Products were tested for Listeria at ALP as part of quality assurance programmes. By taking part in the LMP, customers provide important evidence to ensure compliance with legal requirements (CH law and EU hygiene regulations). Furthermore, ALP provides a Listeria Advisory Team. The team can be called in for planning and consultation in partial or total decontamination of facilities enabling businesses to return to the market. The team further provides a checkup of companies safety concepts for any weaknesses or deficits. An evaluation of the years 1996 until 2008 showed that consultations by the ALP Listeria Advisory Team had a sustainable impact: in 85% of cases, the measures taken proved successful over the subsequent years of operation.

Listeriosis in animals is notifiable (TSV, Article 5), i.e. the suspicion or occurrence of such a disease must be reported to the cantonal veterinarian. From 1991 until 1995 never more than 3 cases of listeriosis were reported. Most cases occurred in the time period 1999 until 2004, with reported cases ranging between 27 to 34 per year. Since 2005, no more than 21 cases per year were reported. In the past 10 years (2001 until 2010) 218 listeriosis cases were reported to the FVO by cantonal veterinarians. 94% of these cases
National evaluation of the recent situation, the trends and sources of infection

In comparison to the previous year, the number of reported cases in humans decreased from 67 to 47 in 2011. Consequently, the notification rate decreased from 0.85 (2010) to 0.59 (2011) per 100'000 inhabitants. Persons over 65 years of age remain the most affected age group. The two most frequently identified serovars were 1/2a and 4b, which is in concordance with the previous year. One outbreak of listeriosis (6 cases) was reported from April to July 2011 in the German-speaking part of Switzerland, which was also caused by serovar 1/2a. The most probable source of infection was imported boiled ham.

In order to calculate corresponding prevalences ALP started a new programme, in 2011 in which raw milk cheese pastes were analysed for the presence of various pathogens. 300 samples of various types of raw milk based hard cheeses as well as 98 samples of raw milk based semi-soft cheeses were tested for the presence of L. monocytogenes. All samples were negative for L. monocytogenes.

In the framework of the Listeria Monitoring Programme (LMP) 4'314 samples were tested for the presence of listeria in 2011. L. monocytogenes were detected in 24 samples (0.6%), 21 of which were samples from the surroundings, 2 from semi-soft cheese and 1 from hard cheese. In all three types of products the bacteria were found on the surface. Other species of listeria were found in 86 samples (2%). With regard to listeria in the dairy industry, the situation has remained on a constantly low level for many years.

2011, 15 cases of listeriosis were reported to the FVO by the cantonal veterinarians. All 15 cases affected ruminants (8 in cattle, 3 in sheep and 4 in goats).

In veterinary diagnostic laboratories 82 tests for listeriosis were carried out in the context of clinical investigations in 2011, 2/3 of them in ruminants and 1/3 in horses, pigs and other animals.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Listeria are repeatedly leading to disease in humans. Even if the number of cases is relatively small, the high mortality, especially in older people, makes it very significant.

Milk products and cheeses are a potential source of infection. Monitoring the occurrence of Listeria at different stages in the food chain is extremely important to prevent infections with contaminated food. With regard to listeria in the dairy industry, the situation has remained on a constantly low level for many years.

In animals, the reported listeriosis cases have remained stable at a low level over the last years.

Additional information

1. In a border control inspection program risk-based random samples are taken. In 2011, these included 24 fish samples from Vietnam and Morocco, all of which were Listeria spp. negative.
2. Further information can be found on the FVO website www.bvet.admin.ch.
### 2.3.2 Listeriosis in humans

#### Table Listeria in humans - Species/serotype distribution

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases</th>
<th>Cases Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listeria</td>
<td>47</td>
<td>.7</td>
</tr>
<tr>
<td>Listeria spp., unspecified</td>
<td>4</td>
<td>0.1</td>
</tr>
<tr>
<td>L. monocytogenes - L. monocytogenes serovar 1/2b</td>
<td>3</td>
<td>0.1</td>
</tr>
<tr>
<td>L. monocytogenes - L. monocytogenes serovar 1/2a</td>
<td>29</td>
<td>0.4</td>
</tr>
<tr>
<td>L. monocytogenes - L. monocytogenes serovar 4b</td>
<td>11</td>
<td>0.1</td>
</tr>
</tbody>
</table>
### Table Listeria in humans - Age distribution

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>L. monocytogenes</th>
<th>Listeria spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>M</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>25 to 44 years</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>45 to 64 years</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>65 years and older</td>
<td>31</td>
<td>18</td>
</tr>
<tr>
<td>Total :</td>
<td>47</td>
<td>24</td>
</tr>
</tbody>
</table>
2.3.3 Listeria in foodstuffs

A. L. monocytogenes in food - Cheeses made from cows' milk - at processing plant - Monitoring (The same monitoring was done in processing plants producing goats semi-soft cheese.)

Preventive measures in place
The implementation of a hygiene concept in order to control the safety of the products is in the responsibility of the producers. All larger cheese producers run a certified quality management fulfilling ISO 9000. The federal research station Agroscope Liebefeld Posieux (ALP) is running a Listeria monitoring program for early detection of Listeria in production facilities.

Measures in case of the positive findings
The concerned food has to be confiscated and destroyed. Depending on the situation the product is recalled and a public warning is submitted.

Results of the investigation
In the framework of the Listeria Monitoring Programme (LMP) 4’314 samples were tested for the presence of listeria in 2011. L. monocytogenes were detected in 24 samples (0.6%), 21 of which were samples from the surroundings, 2 from semi-hard cheese and 1 from hard cheese. In all three types of products the bacteria were found on the surface. Other species of listeria were found in 86 samples (2%). With regard to listeria in the dairy industry, the situation has remained on a constantly low level for many years.
## Table Listeria monocytogenes in milk and dairy products

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for L. monocytogenes</th>
<th>Units tested with detection method</th>
<th>Listeria monocytogenes presence in x g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cheeses made from cows’ milk - hard - made from raw or low heat-treated milk - Monitoring</td>
<td>ALP</td>
<td>Unspecified</td>
<td>Official sampling</td>
<td>food sample</td>
<td>Single</td>
<td>25g</td>
<td>300</td>
<td>0</td>
<td>300</td>
<td>0</td>
</tr>
<tr>
<td>ALP Unspecified</td>
<td>Official sampling</td>
<td>food sample</td>
<td>Single</td>
<td>25g</td>
<td>98</td>
<td>98</td>
<td>0</td>
<td>98</td>
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</table>

### Footnote:

- ALP = Agroscope Liebefeld Posieux
### Table Listeria monocytogenes in other foods

<table>
<thead>
<tr>
<th></th>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for L. monocytogenes</th>
<th>Units tested with detection method</th>
<th>Listeria monocytogenes presence in x g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish - at border control - Monitoring (food imported from third countries)</td>
<td>FVO</td>
<td>Selective sampling</td>
<td>Official sampling</td>
<td>food sample</td>
<td></td>
<td>Single</td>
<td>25g</td>
<td>24</td>
<td>0</td>
<td>24</td>
<td>0</td>
</tr>
</tbody>
</table>

#### Footnote:

Samples originated from Vietnam and Morocco

#### Comments:

The FVO runs a border inspection programme in which risked-based random samples are taken from commodities imported from third countries. As commodities from third countries can only be inspected at the airports and because this mode of importation is quite expensive not many samples can be tested.
### 2.3.4 Listeria in animals

#### Table Listeria in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Units tested</th>
<th>Total units positive for Listeria</th>
<th>L. monocytogenes</th>
<th>Listeria spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle (bovine animals) - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>14</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Dogs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Goats - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
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<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Other animals - Clinical investigations</td>
<td>FVO</td>
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<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>12</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Pigs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>11</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sheep - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>18</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Solipeds, domestic - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>8</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Footnote:

All data categorised as "clinical investigations" are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".
2.4 E. COLI INFECTIONS

2.4.1 General evaluation of the national situation

A. Verotoxigenic Escherichia coli infections general evaluation

History of the disease and/or infection in the country

Laboratories report the detection of EHEC and physicians report EHEC diseases within one week to the cantonal health authorities and to the Federal Office of Public Health (FOPH). Since the first reporting in 1999 confirmed human VTEC cases are fluctuating between 28 and 67 cases per year. The incidence of VTEC infections was never above 0.9 reports per 100,000 inhabitants. Babies and infants aged up to 4 years old are the most frequently affected and disease often develops to the severe form of haemolytic-uraemic syndrome (HUS). From 114 cases occurring from 1997 to 2004 81.5% involved pre-school children suggesting that VTEC is primarily a paediatric problem.

In a study conducted 2010 (Käppeli et al., 2011) 97 human non-O157 VTEC isolates - collected from patients from 2000 to 2009 - were further characterized. In total, 40 different serotypes were found, of which serotypes O26:H11/H-; O103:H2; O121:H19; O145:H28/H- dominated. O26:H11/H- was the one which was most frequently associated with HUS. The high genetic diversity indicates that the non-O157 STEC infections in Switzerland are often sporadic and not major outbreaks.

Furthermore, it is known that VTEC infections also occur frequently after trips abroad to warmer climes. From 1999 to 2006 in 249 cases of EHEC diseases it was found that 62.7% of the patients had been abroad in the week before the onset of the disease. The most common regions mentioned were Southern Europe (incl. Turkey), North Africa, Central America and India.

Figures from food producing animals show that ruminants, especially small ruminants, are an important reservoir for STEC infections in Switzerland. A survey at slaughter in 2000 showed that 14% of faecal samples from cattle, 30% from sheep and 22% from pigs were STEC-positive. In bovine species, it was also found that younger animals excrete more STEC than older animals. Caution is therefore needed when interpreting average figures on the occurrence of STEC for the whole cattle population. In swine the virulence factors of the majority of the found strains seem to be of low virulence.

A study in the 1990s showed that 2.4% of minced meat samples and 21.6% of uncooked, deep-frozen hamburgers were positive for STEC.

Raw milk cheese was tested for STEC from 2006 to 2008 as part of the "national monitoring program for dairy products" (Zweifel et al. 2010). In 1422 samples of raw milk cheese from all over Switzerland, STEC strains could be isolated from 29 of these cheeses in cultures involving 24 semi-hard cheeses and 5 soft cheeses. Thirteen of the 24 strains typeable with O antisera belonged to the serogroups O2, O22 and O91. Nine strains harbored hlyA (enterohemorrhagic E. coli hemolysin), whereas none of the strains tested positive for eae (intimin). The data from the national monitoring program for dairy products confirm a low prevalence of STEC-strains in semi-hard and soft cheese from raw milk. All isolated strains belonged to non-O157 serotypes. These findings confirm that raw milk cheese may constitute a possible source of infection for STEC.

National evaluation of the recent situation, the trends and sources of infection

71 diagnostically established cases of EHEC were registered in 2011. The notification rate was 0.9 new infections per 100'000 inhabitants (previous year: 0.4). This increase of EHEC cases can be partially contributed to the EHEC outbreak in Germany and in the resulting increased disease awareness. Most cases were reported in May (14 cases) and June (13 cases), which coincides with the EHEC outbreak in
Switzerland - 2011 Report on trends and sources of zoonoses

Germany. 5 of 71 cases were caused by the O104:H4 strain, the outbreak strain in Germany. Since all 5 affected individuals had stayed in Germany prior to the onset of the disease, it is most likely that they got infected there. In 8 cases serogroup O157 was confirmed and in 9 cases it could be excluded. The other strains remained completely unknown. The most affected age group were young children under 5 years of age. 12 of 17 reported cases with haemolytic uremic syndrome (HUS) were reported from this age group.

2011, two studies relating to Shiga-toxin producing E. coli (STEC) in foodstuffs were conducted by the national reference laboratory within the reporting period. It was shown in a recently published study by Stephan et al. 2008 that 5% of semi-hard raw milk cheeses in Switzerland contain STEC. In a follow-up study (Peng et al. 2012) the die-off behavior of Shiga-toxin producing E. coli was studied during the ripening process of semi-hard raw milk cheeses. It was demonstrated that STEC could be detected after 16 weeks of ripening irrespective of the selected burning temperature (40°C und 46°C) and the initial contamination level (low level and high level).

The other study was concerned with the occurrence of STEC in foods of plant origin (Althaus et al. 2012). Only one out of 233 samples (ready-to-eat lettuce (142), freshly cut fruits (64) and sprouts (27)) was found to be contaminated with a low pathogenic STEC.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The situation with regard to STEC cases in humans is stable. Thorough cooking of critical foods prevents infection with STEC originally present in the raw products. The findings of the study looking at the behavior of STEC during the ripening process of semi-hard raw milk cheeses underline the importance of good hygiene in the context of milk production and show that STEC are a relevant hazard in this type of dairy product.

As most of the laboratories do not routinely test for VTEC, it is very likely that the impact of VTEC is underestimated. In view of the low infectious dose of STEC (<100 microorganisms) an infection via contaminated food or water is easily possible.

Recent actions taken to control the zoonoses

2011, two studies relating to Shiga-toxin producing E. coli (STEC) in foodstuffs were conducted by the national reference laboratory to generate new information (results see above).

Additional information

8. Further information can be found on the FVO website www.bvet.admin.ch.
### 2.4.2 E. coli infections in humans

**Table Escherichia coli, pathogenic in humans - Species/serotype distribution**

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases Inc.</th>
<th>Autochthon cases</th>
<th>Autochthon Inc.</th>
<th>Imported cases</th>
<th>Imported Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli, pathogenic</td>
<td>71</td>
<td>.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>HUS</td>
<td>17</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E.coli infect. (except HUS)</td>
<td>54</td>
<td>0.7</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Footnote:

HUS: All 17 cases were clinically and laboratory confirmed. In 13 cases the serogroup was unknown (inc: 0.2). 2 cases were caused by O157 (inc:<0.1) and 2 by other VTEC (inc:<0.1).

E. coli infection (except HUS): 54 cases were clinically and laboratory confirmed. In addition, there were 5 cases which were only laboratory confirmed and thus not included in the total of the definitiv cases. The serogroup was unknown in 46 cases (inc: 0.6). 6 cases were caused by O157 (inc:<0.1) and 7 by other VTEC (inc:<0.1).
### Table Escherichia coli, pathogenic in humans - Age distribution

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>Verotoxigenic E. coli (VTEC)</th>
<th>Verotoxigenic E. coli (VTEC) - VTEC O157:H7</th>
<th>Verotoxigenic E. coli (VTEC) - VTEC non-O157</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>7</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>1 to 4 years</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>5 to 14 years</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>15 to 24 years</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>25 to 44 years</td>
<td>15</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>45 to 64 years</td>
<td>11</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>65 years and older</td>
<td>10</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>76</td>
<td>39</td>
<td>37</td>
</tr>
</tbody>
</table>
2.5 TUBERCULOSIS, MYCOBACTERIAL DISEASES

2.5.1 General evaluation of the national situation

A. Tuberculosis general evaluation

History of the disease and/or infection in the country

Among the reported tuberculosis cases each year, the proportion of tuberculosis cases attributable to Mycobacterium bovis (bovine tuberculosis) has been constantly lower than 2% since many years. Bovine tuberculosis cases are reported each year on a low scale (between 4 and 8 cases per year in the years 2005 to 2010).

Switzerland is officially acknowledged as free from bovine tuberculosis since 1959. Between 1960 and 1980, the entire bovine population was tested every other year in an active surveillance programme. Since 1980, monitoring has been conducted only in the form of passive surveillance at the slaughterhouse. The official meat inspection is investigating each carcass, its organs and lymphatic tissue on the prevalence of abnormal alterations. Carcasses showing clinical signs of tuberculosis have to be destroyed. Since then, isolated cases of bovine tuberculosis have been found (most recently in 1998), which were partly due to reactivation of Mycobacterium bovis infections in humans with subsequent infection of bovine animals. Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of about 10% of farms (4874 farms). 111'394 cattle (whole holdings older than 6 months) were tuberculin tested. In 72 farms tests had to be repeated. All farms were negative.

No cases of TB were found in captive wild animals that were tested in 1998 (Wyss et al. 2000).

In the last two decades, no more than two cases per year in animals were reported to the FVO by cantonal veterinarians. In the last 10 years a total of 9 cases were registered, of which none occurred in cattle, affecting parrots (2), cats (2) and one each of monkeys, chicken, dogs, horses and lamas.

National evaluation of the recent situation, the trends and sources of infection

In 2011 the Federal Office of Public Health received reports from 578 cases of tuberculosis, 487 of which could be diagnostically confirmed. 370 of them were caused by M. tuberculosis, 13 by M. bovis, 10 by M. africanum and 4 by M. caprae. 90 strains could not be identified. With 13 reported cases, the number of M. bovis associated tuberculosis reports increased compared to the previous year. This increase was mainly observed in over 64 year old Swiss citizens (n=8). The other 5 cases were reported in under 65 year old persons with migration background.

In animals, 2 cases of tuberculosis in lamas (1) and cats (1) were reported in 2011. Furthermore, 60 tests were carried out in veterinary diagnostic laboratories (1/3 each in farm animals (mainly pigs), pets and other species). Within the framework of a dissertation from August 2009 to February 2012 (Schöning 2012), 165 wild boars and 269 red deer were tested for tuberculosis. Bacteria from the MTBC complex were detected in 6 wild boars (3.6%) and none of the red deer. None of the samples tested positive for M. bovis or M. caprae.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

There is no risk of an TB infection by contact to infected bovines within Switzerland or through food.
Recent actions taken to control the zoonoses

Because M. caprae infection in red deer is endemic in Austria (Tyrolia and Vorarlberg) since the 90ties, the summer grazing of Swiss cattle in these regions poses a certain risk. Other risk factors are wild animals living close to the Austrian or German border and the international trade with animals.
Within the framework of a dissertation from August 2009 to February 2012 (Schöning 2012, unpublished at the Vetsuisse Faculty in Bern and Zurich), 582 cattle of the Canton St. Gallen, which spent the Alpine pasturing season 2009 on Alpine pastures in Austria, were tested in 2010 using the tuberculin skin test. 23 cows reacted with an unclear result, but were negative after retesting with either or both of the following methods: the tuberculin skin test as well as the Interferon-gamma test.
In addition, wild animal populations of areas bordering Austria, Italy and France were tested for tuberculosis (results see above). The results of the dissertation give no indication of the occurrence of the disease in either the pastured cattle in Austria nor the wild game population of Switzerland.

Additional information

2. Schöning 2012, dissertation, unpublished
3. Further information can be found on the FVO website www.bvet.admin.ch.
2.5.2 Tuberculosis, mycobacterial diseases in humans

A. Tuberculosis due to Mycobacterium bovis in humans

Reporting system in place for the human cases

Tuberculosis in humans is a notifiable disease. Medical doctors have to report within one week the detection of mycobacteria (of the Mycobacterium tuberculosis complex) in culture or the start of a treatment with more than 3 different antituberculosis agents. Laboratories have to report the detection of mycobacteria of the Mycobacterium tuberculosis complex as well (ordinance of the FDHA on medical doctor and laboratory reporting).
## Table Mycobacterium in humans - Species/serotype distribution

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases</th>
<th>Cases Inc.</th>
<th>Autochthon cases</th>
<th>Autochthon Inc.</th>
<th>Imported cases</th>
<th>Imported Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mycobacterium</td>
<td>487</td>
<td>6.2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>M. bovis</td>
<td>13</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. tuberculosis</td>
<td>370</td>
<td>4.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. africanum</td>
<td>10</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. caprae</td>
<td>4</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mycobacterium spp., unspecified</td>
<td>90</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age distribution</td>
<td>M. bovis All</td>
<td>M. bovis M</td>
<td>M. bovis F</td>
<td>Mycobacterium spp., unspecified All</td>
<td>Mycobacterium spp., unspecified M</td>
<td>Mycobacterium spp., unspecified F</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>-------------</td>
<td>-----------------------------------</td>
<td>-------------------------------</td>
<td>-------------------------------</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1 to 4 years</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>5 to 14 years</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>7</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>15 to 24 years</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>73</td>
<td>45</td>
<td>28</td>
</tr>
<tr>
<td>25 to 44 years</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>205</td>
<td>122</td>
<td>83</td>
</tr>
<tr>
<td>45 to 64 years</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>108</td>
<td>68</td>
<td>40</td>
</tr>
<tr>
<td>65 years and older</td>
<td>8</td>
<td>3</td>
<td>5</td>
<td>72</td>
<td>41</td>
<td>31</td>
</tr>
<tr>
<td>Total :</td>
<td>13</td>
<td>5</td>
<td>8</td>
<td>474</td>
<td>285</td>
<td>189</td>
</tr>
</tbody>
</table>
2.5.3 Mycobacterium in animals

A. Mycobacterium bovis in bovine animals

Status as officially free of bovine tuberculosis during the reporting year
The entire country free

Switzerland is officially acknowledged as free from bovine tuberculosis. Requirements of section 3.2.3.10 of the OIE International Animal Health Code are fulfilled since 1959. Free status is recognised by EU (Bilateral Agreement on Agriculture, Veterinary Annex). Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 111’394 cattle (whole holdings older than 6 months) were tuberculin tested. In 72 farms tests had to be repeated. All farms were negative.

Monitoring system
Case definition
Tuberculosis is defined as the detection of Mycobacterium bovis or Mycobacterium tuberculosis (TSV, Articles 158 – 159).

Vaccination policy
Vaccination is prohibited.

Notification system in place
Bovine tuberculosis is notifiable since 1950. Bovine tuberculosis is regulated as zoonoses to be eradicated (Swiss ordinance of epizootics, TSV Art. 158 - Art. 165). Notification of suspicious cases is mandatory. Actions to be taken in suspicious farms are ban of all animal traffic and investigation of the whole herd. In confirmed cases (herds) all diseased or suspicious cattle has to be slaughtered and the milk of them is disposed. The barn has to be disinfected.

National evaluation of the recent situation, the trends and sources of infection
Up to date there are no observations that would challenge the freedom of Swiss cattle from tuberculosis. Especially the results of the monitoring of cattle which were on Alpine pastures in Austria and of red deer and wild pigs in the Alpine region close to the Swiss border in 2010 will be important for a more accurate evaluation.
### Table Tuberculosis in other animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Mycobacterium</th>
<th>M. bovis</th>
<th>M. tuberculosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpacas - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Birds - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Camels - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cats - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cattle (bovine animals) - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Dogs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other animals - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>20</td>
<td>6</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Pigs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>16</td>
<td>3</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Wild animals - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal</td>
<td>Animal</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

Footnote:

All data categorised as "clinical investigations" are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations".
Table Bovine tuberculosis in countries and regions that do not receive Community co-financing for eradication programmes

<table>
<thead>
<tr>
<th>Region</th>
<th>Total number of existing bovine</th>
<th>Officially free herds</th>
<th>Infected herds</th>
<th>Routine tuberculin testing</th>
<th>Number of tuberculin tests carried out before the introduction into the herds (Annex A(I)(2)(c) third indent (1) of Directive 64/432/EEC)</th>
<th>Number of animals with suspicious lesions of tuberculosis examined and submitted to histopathological and bacteriological examination</th>
<th>Number of animals detected positive in bacteriological examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Schweiz/Suisse/Svizzera</td>
<td>41018</td>
<td>1583151</td>
<td>41018</td>
<td>0</td>
<td>0</td>
<td>N.A.</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total :</strong></td>
<td><strong>41018</strong></td>
<td><strong>1583151</strong></td>
<td><strong>41018</strong></td>
<td><strong>0</strong></td>
<td><strong>0</strong></td>
<td><strong>N.A.</strong></td>
<td><strong>2</strong></td>
</tr>
</tbody>
</table>

Comments:

1) N.A.

Footnote:

Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 111'394 cattle were tuberculin tested. All farms were negative.
2.6 BRUCELLOSIS

2.6.1 General evaluation of the national situation

A. Brucellosis general evaluation

History of the disease and/or infection in the country

Brucellosis in humans is a notifiable disease. Laboratories must report the detection of Brucella within one week (ordinance of the FOHA on doctor and laboratory reports). The number of detections of Brucella spp. in humans have been rare for many years. The literature shows that in contrast to Biovar 1 and Biovar 3, B. suis Biovar 2 is very rarely notified in humans (probably as Biovar 2 is known to be less virulent to humans than Biovar 1 and 3). Brucellosis in animals falls into the category of a "disease to be eradicated" (TSV, Article 3). Government measures are applied to control brucellosis in sheep and goats (Brucella melitensis, TSV, Articles 190-195), in cattle (Brucella abortus, TSV, Articles 150-157) and in pigs (Brucella suis as well as Brucella abortus and Brucella melitensis, TSV, Articles 207 – 211). These animal species must be tested for brucellosis in cases where the causes of abortion are being investigated (TSV, Article 129). Bovine brucellosis is notifiable since 1956, in sheep and goats since 1966.

Switzerland is officially recognised as free of brucellosis in cattle, sheep and goats. The last case of bovine Brucella abortus infection was reported in 1996, the last case of Brucella melitensis infection in small ruminants in 1985. Freedom from bovine brucellosis has been proven the last time in 1997 conducting a survey in a randomized sample of 4'874 farms. 139'655 cows (in general older than 24 months) were tested using a serological test. There were no positive findings in these samples. Since 1998 the freedom of the sheep and goat population from disease is documented annually in National Surveys with serological testing (TSV, Article 130). The farms to be tested are randomly selected. EU regulation 91/68/EEC that defines populations of sheep and goat as one epidemiological unit is the basis of the survey.

Brucella suis in pigs is very rare: after a reported case in a wild boar in 2001, three cases occurred in 2009 in pigs (Brucella suis Biovar 2), the first cases since many years in domestic pigs. The primary outbreak was in a farm where the pigs were reared outdoor and contact to wild boars was very likely. Two secondary farms had contact to the first one via animal traffic.

Vaccination is prohibited since 1961. Requirements of section 3.2.1.5 of the OIE International Animal Health Code are fulfilled since 1963. Free status is recognised by EU (Bilateral Agreement on Agriculture, Veterinary Annex).

National evaluation of the recent situation, the trends and sources of infection

In 2011 8 brucellosis cases were reported, all of which were caused by Brucella melitensis. Among these cases, 4 affected members of the same family that had consummated imported raw milk cheese from abroad.

Human infections with Brucella through the consumption of Swiss raw milk or dairy products from non-heat-treated milk (for example sheep or goat’s cheese) is considered to be of no relevance in Switzerland, because the Swiss animal population is free of this pathogen. Cases of brucellosis in humans are anticipated to be attributable either to stays abroad or to the consumption of foreign products.

In the yearly National Survey in 2011 a total of 681 sheep farms (10'998 blood samples) and 526 goat farms (5'030 blood samples) were tested negative for Brucella melitensis. Furthermore, no cases of brucellosis in sheep and goats were reported by the cantonal veterinarians. In addition, a total of 1’281
animals were tested in the context of clinical investigations or abortions in 2011 in diagnostic laboratories. It is known that B. suis Biovar 2 is prevalent in wild boars (Leuenberger et al., 2007). In a recent study conducted between 2008 and 2010 Wu (2011) found that 28.8% (95% CI 23.0%-34.0%) of the tested wild boars were Brucella suis Biovar 2 positive and 35.8% (95% CI 30.0%-42.0%) had antibodies against B. suis. These findings were significantly higher than in previous studies indicating a spread of B. suis Biovar 2 in Swiss wild boars. In addition, Wu (2011) found that mainly outdoor pigs which are outside the whole day, close to the forest (<50m) and with low fences (<60cm) had the highest risk of contact with wild boars. A questionnaire revealed that 31% of the gamekeeper and 25% of outdoor pig holders observed at least 1 interaction between wild boars and pigs in the past 20 years. 5% of holdings reported hybrides. As wild boars live mainly in the Jura and holdings which keep pigs outdoors are located mainly in the middle part of Switzerland, contacts are most likely to occur at the border of these two regions.

Although the cases in 2009 are unlikely to have come from wild boar contacts (comparison of the isolates found in pigs in 2009 with those found in wild boars using the MLVA (Multi locus variable number of tandem repeats) typing method showed no relation amongst these (Abril 2011)), the occurrence of B. suis in wild pigs should be investigated also in the future.

Recent actions taken to control the zoonoses

National surveys on a yearly basis are carried out to document freedom from brucellosis in sheep and goat.
A research study was conducted in 2008 -2010 to obtain recent B. suis prevalence data in wild boars and to evaluate risk factors for the infection of pigs which are reared outdoor (results see above).

Additional information

8. Further information can be found on the FVO website www.bvet.admin.ch.
2.6.2 Brucellosis in humans

Table Brucella in humans - Species/serotype distribution

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases</th>
<th>Cases Inc.</th>
<th>Autochthon cases</th>
<th>Autochthon Inc.</th>
<th>Imported cases</th>
<th>Imported Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brucella</td>
<td>8</td>
<td>0.1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B. melitensis</td>
<td>8</td>
<td>0.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age distribution</th>
<th>B. abortus</th>
<th>B. melitensis</th>
<th>Brucella spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>M</td>
<td>F</td>
</tr>
<tr>
<td>&lt;1 year</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1 to 4 years</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5 to 14 years</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15 to 24 years</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>25 to 44 years</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>45 to 64 years</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>65 years and older</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total:</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
2.6.3 Brucella in animals

A. Brucella abortus in bovine animals

Status as officially free of bovine brucellosis during the reporting year

The entire country free

- Switzerland is officially acknowledged as free from bovine brucellosis since 1959. Bovine brucellosis is notifiable since 1956. Requirements of section 3.2.1.5 of the OIE International Animal Health Code are fulfilled since 1963. Free status is recognised by EU (Bilateral Agreement on Agriculture, Veterinary Annex).
- Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 139,655 cows (in general older than 24 months) were tested using serological test were tested. Tests were performed in blood samples from 31,042 animals and in 18,952 pooled bulk milk samples. There were no positive findings in these samples.

Vaccination policy

- Vaccination is prohibited since 1961.

Measures in case of the positive findings or single cases

- Actions to be taken in suspicious farms are ban of all animal traffic and investigation of the whole herd as well as the placenta of calving cows.
- In confirmed cases (herds) the whole herd has to be killed immediately. All placentas, abortion material and the milk of diseased and suspicious animals have to be disposed. The barn has to be disinfected.
- Official meat inspection is investigating each carcass, its organs and lymphatic tissue on the prevalence of abnormal alterations. Carcasses showing clinical signs of brucellosis have to be destroyed and farms of origin are investigated.

Notification system in place

- Notification of suspicious cases and outbreaks is mandatory since 1956. Brucellosis in bovine animals is regulated as zoonoses to be eradicated (TSV, Art. 150 - Art. 157).

National evaluation of the recent situation, the trends and sources of infection

- There are no observations that would challenge the freedom of Swiss cattle population from brucellosis.
B. Brucella melitensis in goats

Status as officially free of caprine brucellosis during the reporting year

The entire country free

Switzerland is officially acknowledged as free from ovine and caprine brucellosis. Freedom from disease has been proved every year since 1998 conducting a survey in a randomized sample of farms. Free status is recognized by EU (Bilateral Agreement on Agriculture, Veterinary Annex).

Additional information

EU regulation 91/68/EEC that defines populations of sheep and goat as one epidemiological unit is the basis of the survey. Scientific basis is published by Hadorn et al. 2002: Risk-based design of repeated surveys for the documentation of freedom from non-highly contagious diseases. Preventive Veterinary Medicine (2002) 56: 179-192.

Vaccination policy

Vaccination is prohibited since 1961.

Measures in case of the positive findings or single cases

Actions to be taken in suspicious farms are ban of all animal traffic and the investigation of the whole herd. In confirmed cases (herds) the whole herd has to be killed immediately. All placentas, abortion material and the milk of diseased and suspicious animals have to be disposed. The barn has to be disinfected. Official meat inspection is investigating each carcass, its organs and lymphatic tissue on the prevalence of abnormal alterations. Carcasses showing clinical signs of brucellosis have to be destroyed and farms of origin are investigated.

Notification system in place

Notification of suspicious cases and outbreaks is mandatory since 1966. Brucellosis in sheep and goats is regulated as zoonoses to be eradicated (TSV, Art. 190 - Art. 195).

Results of the investigation

In 2011 a randomized sample of 681 farms with sheep and 526 farms with goats were included in the survey. 10'998 samples from sheep and 5'030 samples from goats were tested using serological test. There were no positive findings in these samples.

National evaluation of the recent situation, the trends and sources of infection

There are no observations that would challenge the freedom of Swiss sheep and goat population from brucellosis.
Switzerland - 2011 Report on trends and sources of zoonoses

C. Brucella melitensis in sheep

Status as officially free of ovine brucellosis during the reporting year

The entire country free

Switzerland is officially free of ovine brucellosis during reporting year. The entire country is free.
<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Brucella</th>
<th>B. abortus</th>
<th>B. melitensis</th>
<th>B. suis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpacas - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle (bovine animals) - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>1206</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goats - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>16</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other animals - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>3</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>13</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>34</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solipeds, domestic - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>6</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table Brucellosis in other animals**

Brucella spp., unspecified

- Alpacas - Clinical investigations
- Cattle (bovine animals) - Clinical investigations
- Goats - Clinical investigations
- Other animals - Clinical investigations
- Pigs - Clinical investigations
- Sheep - Clinical investigations
- Solipeds, domestic - Clinical investigations
Table Brucellosis in other animals

Footnote:
All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of “clinical investigations”.
### Table Ovine or Caprine Brucellosis in countries and regions that do not receive Community co-financing for eradication programme

If present, the row "Total-1" refers to analogous data of the previous year.

<table>
<thead>
<tr>
<th>Region</th>
<th>Total number of existing</th>
<th>Officially free herds</th>
<th>Infected herds</th>
<th>Surveillance</th>
<th>Investigations of suspect cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Herds</td>
<td>Animals</td>
<td>Number of herds</td>
<td>%</td>
<td>Number of herds</td>
</tr>
<tr>
<td>Schweiz/Suisse/Svizzer</td>
<td>15155</td>
<td>497739</td>
<td>15155</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>Total :</td>
<td>15155</td>
<td>497739</td>
<td>15155</td>
<td>100</td>
<td>0</td>
</tr>
</tbody>
</table>

**Comments:**

1) In 2011 a randomized sample of 681 farms with sheep and 526 farms with goats were included in the survey. 10'998 samples from sheep and 5'030 samples from goats were tested using serological tests. There were no positive findings in these samples.

2) N.A.
Table Bovine brucellosis in countries and regions that do not receive Community co-financing for eradication programme

<table>
<thead>
<tr>
<th>Region</th>
<th>Total number of existing bovine</th>
<th>Officially free herds</th>
<th>Infected herds</th>
<th>Surveillance</th>
<th>Investigations of suspect cases</th>
<th>Epidemiological investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Herds Animals Number of herds %</td>
<td>Number of herds</td>
<td>Number of herds</td>
<td>Number of bovine herds tested</td>
<td>Number of animals tested</td>
<td>Number of infected herds</td>
</tr>
<tr>
<td>Schweiz/Suisse/Svizzera</td>
<td>41018 1583151</td>
<td>41018 100</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
</tr>
<tr>
<td>Total :</td>
<td>41018 1583151</td>
<td>41018 100</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
<td>0 0</td>
</tr>
</tbody>
</table>

Comments:

1) N.A.

Footnote:

Freedom from disease has been proven in 1997 conducting a survey in a randomized sample of 4874 farms. 139’655 cows were tested using serological test were tested. Tests were performed in blood samples from 31042 animals and in 18952 pooled bulk milk samples. There were no positive findings in these samples.
2.7  YERSINIOSIS

2.7.1  General evaluation of the national situation

A. Yersinia enterocolitica general evaluation

History of the disease and/or infection in the country

Yersiniosis in humans is not notifiable. Thus, no data on the occurrence of human yersiniosis are available.

In animals, yersiniosis is notifiable (TSV, Article 5 and Article 291) and cantonal veterinarians may issue an order for a suspected case to be investigated.

In most cases, yersiniosis is caused by Yersinia enterocolitica and, in rare cases, also by Yersinia pseudotuberculosis. In the past ten years (2002-2011) never more than 3 cases per year were reported, in the last 5 years even never more than 1. 4 (28%) of the 14 yersiniosis cases reported during this time period affected monkeys, 7 (50%) were unknown species and one case each occurred in sheep, rabbits and alpacas.

In 2001 faecal samples of 88 farms with fattening pigs were analysed for yersinia. 56 of the 88 (64%) were Yersinia positive. In 133 of the 352 faecal samples Y. enterocolitica was isolated. 37% of the 133 isolates were Biotype 1A, 10% Biotype 4/O:3, 4% Biotype 3/O:3; 13,5% Biotype 2/O:9 and 29% Biotype 2/neither O:3 nor O:9. In this study the use of medical feed at beginning of housing was a potential risk factor.

In 2002 865 Swiss pig meat samples (Schnitzel, minced meat, chopped meat) were collected in 283 different markets. 15,5% were Y. enterocolitica positive, of which almost 90% were Biotype 1A. Overall in 0,7% of the 865 samples potentially humanpathogenic Y. enterocolitica were isolated.

From 2003 until 2005 a yersinia monitoring on the surface of slaughter pig carcasses at the four largest slaughter houses was conducted. Each year 80 slaughter pigs were sampled (from each pig samples from 4 different regions of the carcass were pooled). Low rates of Yersinia contamination on the carcass surfaces were found (between 1% und 6%).

In 2006, tonsils of 212 slaughter pigs representing 16 farms were sampled in one single slaughter house. Using real-time PCR 88% of the 212 tonsils were positive. Using the culture method prevalence rates were much lower (34%). 69 isolates (96%) were found to be Biotype 4/O:3, 6 isolates were Biotype 2/O:5;27 and 1 Biotype 2/O:9.

Between October 2007 and March 2008 153 wild boars shot in the region of Geneva were sampled. 65% of the wild boars had antibodies in the tonsil fluids. Using PCR 44% of the tonsils were positive for Yersinia spp., 35% for Y. enterocolitica and 20% for Y. pseudotuberculosis. However, in culture detection rates were much lower: 9% for Y. enterocolitica and 3% for Y. pseudotuberculosis.

National evaluation of the recent situation, the trends and sources of infection

No cases in animals were reported to the FVO by the cantonal veterinarians in 2011. The number of reported cases in the recent years has been constantly at a very low level.

In veterinary diagnostic laboratories 2339 tests for yersiniosis were carried out in the context of clinical investigations in 2011, mainly in dogs and cats (79%), cattle (6%), horses (5), birds (3%) and “other species” (5%). Except for 13 dogs and 1 pig all laboratory results were negative (see table Yersinia in...
Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The risk of infection for humans is estimated to be minimal in Switzerland.

Recent actions taken to control the zoonoses

Switzerland carries out a Yersinia prevalence study in tonsils in slaughter pigs from March 2012 to February 2013 according to the technical specifications for harmonized national surveys on Yersinia enterocolitica in slaughter pigs (EFSA Journal 2009; 7(11):1374).

Additional information

Further information can be found on the FVO website www.bvet.admin.ch.
## 2.7.2 Yersinia in animals

### Table Yersinia in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Yersinia</th>
<th>Y. enterocolitica</th>
<th>Y. pseudotuberculosis</th>
<th>Yersinia spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpacas - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Birds - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>62</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Camels - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cats - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>752</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cattle (bovine animals) - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>136</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>Dogs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>1090</td>
<td>13</td>
<td>13</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Fur animals - farmed - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Goats - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Other animals - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>114</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Pigs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>11</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Rabbits - farmed - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sheep - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>11</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Solipeds, domestic - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>111</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
Table Yersinia in animals

<table>
<thead>
<tr>
<th>Y. enterocolitica - O:3</th>
<th>Y. enterocolitica - O:9</th>
<th>Y. enterocolitica - unspecified</th>
<th>Y. enterocolitica - O:5</th>
<th>Y. enterocolitica - O:5,27</th>
<th>Y. enterocolitica - biotype 1A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpacas - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birds - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Camels - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cats - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cattle (bovine animals) - Clinical investigations</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogs - Clinical investigations</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fur animals - farmed - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goats - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other animals - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigs - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rabbits - farmed - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheep - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solipeds, domestic - Clinical investigations</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of “clinical investigations”.

2.8 TRICHINELLOSIS

2.8.1 General evaluation of the national situation

A. Trichinellosis general evaluation

History of the disease and/or infection in the country

Trichinellosis in humans is a notifiable disease in Switzerland since 1st January 2009. Medical doctors have to report the disease and laboratories the detection of Trichinella spp. (ordinance of the FDHA on doctor and laboratory reporting).

Trichinella infections and suspicion of Trichinella infections in animals are notifiable since 1966. Trichinella infections in animals fall in the category of animal diseases to be monitored (TSV, Article 5).

The testing on trichinellosis of all slaughter pigs is mandatory since 1st January 2007. At that time Switzerland’s regulations got equivalent to Commission Regulation (EC) No. 2075/2005. Exceptions from this obligation are only made for slaughterhouses with a small capacity who do not export to the EU. Meat of pigs which have not been tested for trichinellosis is since then labeled with a special stamp, so it can be guaranteed that such meat is not exported to the EU.

Trichinella infections in pigs have not been detected in Switzerland for many decades. From 2001 to 2004, between 400’000 and 490’000 pigs (15 to 19% of all slaughtered pigs) were tested every year without any positive findings. Since 2005 the number of pigs tested of the pigs slaughtered in abattoirs increased steadily, all with negative results: 34% in 2005, 44% in 2006, about 90% in 2007, 2008 and 2009.

In the last 10 years reported cases in animals to the FVO by the cantonal veterinarians ranged between 0 and 3 cases per year and always concerned carnivorous wild animals, never domestic animals. The 14 cases reported to the FVO by cantonal veterinarians in 2002-2011 concerned lynx (11), foxes (2) and wolves (1). The nematodes involved were of a single species, namely Trichinella britovi.

A study of the University of Berne conducted from 1999 until 2007 found that 15 (27.3%) of 55 assessed lynxes harbored Trichinella britovi larvae. Furthermore, in 2006/2007 21 (1.6%) of 1298 assessed foxes proved positive for Trichinella britovi larvae (Frey et al., Veterinary Parasitology, 2009).

In another study of the University of Berne, 1458 wild boars were tested for Trichinella spp. in 2008. Although all 1458 wild boars have been tested negative for Trichinella by artificial digestion, 3 wild boars had antibodies against Trichinella (seroprevalence 0.2%) illustrating that wild boars can have contact with this nematode (Frey et al., 2009, Schweiz. Archiv für Tierheilkunde).

National evaluation of the recent situation, the trends and sources of infection

In 2011, the Federal Office of Public Health received no report of human trichinellosis.

2011 2660000 million slaughter pigs (94% of all slaughtered pigs) were tested for Trichinella with a negative result. Due to the extensive testing of the last years with only negative results, Swiss slaughter pigs are projected to be free of Trichinella. A study in 2009 confirms this declaration. 20’000 slaughter pigs were tested with an improved digestion method and all animals were free of antibodies against Trichinella spp. (Schuppers et al., 2009, Zoonoses and Public Health). In addition, 2622 horses (84% of all slaughtered horses) were tested for trichinellosis by digestion of meat samples, which all tested negative.
However, the disease is sporadically detected in the wild animal population (excluding wild boars). 2011, one case of Trichinella infection in a lynx was reported to the FVO by the cantonal veterinarians. Furthermore, 1918 wild animals, mainly wild boars, were tested negative for Trichinella.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

Trichinellosis in humans is very rare in Switzerland and is often associated with infections abroad. Although, the risk of transmission from wild animals to domestic pigs is minimal, the surveillance of trichinellosis in wild animals is of vital importance. As all infections in wildlife in the past were T. britovi, Switzerland is considered free of Trichinella spiralis. The estimated risk of Trichinella transmission from wildlife to the slaughter pig population is negligible.

Additional information

2. Frey et al., Veterinary Parasitology, 2009
4. Schuppers et al., Zoonoses and Public Health, 2009
5. Further information can be found on the FVO website www.bvet.admin.ch.
2.8.2 Trichinellosis in humans

Table Trichinella in humans - Species/serotype distribution

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases</th>
<th>Cases Inc.</th>
<th>Autochthon cases</th>
<th>Autochthon Inc.</th>
<th>Imported cases</th>
<th>Imported Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trichinella</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Trichinella spp., unspecified</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
2.8.3 Trichinella in animals

A. Trichinella in horses

Monitoring system

Sampling strategy
The investigation of horses is mandatory (Swiss ordinance of slaughter and meat control, VSFK, Art. 31).

Frequency of the sampling
All slaughtered horses are tested during or immediately after the slaughter process.

Type of specimen taken
Piece of tongue

Case definition
Detection of Trichinella spp. larvae.

Diagnostic/analytical methods used

Results of the investigation including the origin of the positive animals
In 2011 2622 horses (84% of all slaughtered horses) were tested for Trichinella with negative results.

Notification system in place
Trichinellosis in animals is notifiable (TSV, Article 5).

National evaluation of the recent situation, the trends and sources of infection
There are no observations that would challenge the freedom of Swiss horses from trichinellosis.
B. Trichinella in pigs

Monitoring system

Sampling strategy

General
The investigation of slaughtered pigs and wild boars is mandatory (Swiss ordinance of slaughter and meat control, VSFK, Art. 31). All pigs slaughtered in slaughterhouses that are approved to export in the EU are sampled for Trichinella examination. Exception of this test obligation is made for small slaughterhouses of the national market which do not export to the EU.

Frequency of the sampling

General
Census sampling with the exception of pigs slaughtered in small slaughterhouses and only produced for the local market, is done during or immediately after the slaughter process.

Type of specimen taken

General
Piece of pillar of the diaphragm.

Methods of sampling (description of sampling techniques)

General
Piece of pillar of the diaphragm taken at slaughter.

Case definition

General
Detection of Trichinella spp. larvae.

Diagnostic/analytical methods used

General

Measures in case of the positive findings or single cases

A positive tested batch at a slaughter house would be traced back and contaminated carcasses would be disposed of.

Notification system in place

Trichinellosis in animals falls in the category of animal diseases to be monitored (TSV, Article 5).

Results of the investigation including description of the positive cases and the verification of the Trichinella species

In 2011, 2.66 Mio slaughter pigs (94% of the total slaughter population) were tested and no Trichinella larvae were found.
In addition, 1918 wild boars were tested with negative results.

National evaluation of the recent situation, the trends and sources of infection

Although the risk of the parasite cycle crossing from the wild animal population into the conventional domestic pig population can be regarded as negligible, the risk has to be categorised differently or higher with regard to the special situation of grazing pigs.
Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)
  As all results were negative since many years, it is highly unlikely that Trichinella infections acquired in Switzerland do occur.

Additional information
Table Trichinella in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Trichinella</th>
<th>T. spiralis</th>
<th>Trichinella spp., unspecified</th>
<th>T. britovi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solipeds, domestic - horses - at slaughterhouse - Surveillance</td>
<td>1) FVO Census Not applicable animal sample</td>
<td>Animal</td>
<td>2622</td>
<td>0</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigs - at slaughterhouse - Surveillance</td>
<td>2) FVO Census Official sampling animal sample</td>
<td>Animal</td>
<td>2660000</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild boars - wild</td>
<td>3) FVO Unspecified Not applicable animal sample</td>
<td>Animal</td>
<td>1918</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

1) Data originate from the FLEKO = Fleischkontrollstatistik (meat inspection statistics)
2) Data originate from the FLEKO = Fleischkontrollstatistik (meat inspection statistics)
3) Data originate from the ILD = Informationssystem Labordiagnostik (information system of laboratory data) as well as from the FLEKO = Fleischkontrollstatistik (meat inspection statistics). Up to date there is no further differentiation in the ILD among wild animals possible. However, it is known that only very few other wild animals other than wild boars are tested for Trichinella. In 2011, one lynx was found positive for Trichinella britovi.
2.9  ECHINOCOCCOsis

2.9.1 General evaluation of the national situation

A. Echinococcus spp. general evaluation

History of the disease and/or infection in the country

Echinococcus granulosus, the causative agent of Zystic Echinococcosis has nearly been extinced in Switzerland, sporadically imported cases are diagnosed in humans or animals (dogs or cattle or sheep, probably infected from imported infected dogs).

Alveolar echinococcosis (AE) is caused by the “dangerous” fox tapeworm Echinococcus multilocularis. An infection results in disease with severe consequences for the person concerned. Human cases of Echinococcosis were notifiable to FOPH until 1998. Although it is no longer notifiable, data are available. Exact figures on the incidence of AE in humans are collected in Switzerland since 1956 at the Institute of Parasitology of the University of Zurich being the National Reference Centre for echinococcosis. Data originates from cohorts of the large treatment centres as well as analysis of seropositive patients originating from the 3 centres for serodiagnosis of the disease. In comparison to earlier years (1990 until 2000), the frequency of AE increased from the beginning of 2001 until the end of 2008 by the 2.5-fold. From 2006-2010 the average incidence was 0.25 cases in 100’000 per year adding up to approximately 20 (each year 10 – 29 cases) newly diagnosed cases annually. Average age at time of diagnosis in all studies ranged from 52 to 55 years without any significant difference. The age specific incidence yields a significant increase with every 20 years of life except for persons aged > 80 years. The proportion of female cases increased significantly to 55% in the years 1984-2010 compared to earlier years (46%). 55% of all AE cases in Switzerland from 1984-2010 have been diagnosed in patients living in urban areas, although the incidence in rural areas is still significantly higher (0.26 per 100’000 per year from 1984-2010, and 0.12 in urban areas, respectively; p< 0.001). Incidences increased mainly in 6 major agglomeration areas (defined based on criteria such as population size, number of places of employment and proportion of the workforce working in core cities, core areas of an agglomeration, edificial interconnection or bordering of cities): around Constanz, Zurich, Bern, Basel, Lausanne and Geneva.

In animals, echinococcosis is notifiable (TSV, Article 5 and Article 291). Since 1996 reported cases per year rank between 0 and 9 cases. In the past ten years (2001 to 2010) 44 echinococcosis cases were reported to the FVO by cantonal veterinarians. 52% occurred in dogs, 20% in foxes, 12% in monkeys and the remaining 16% in pigs, wild animals and other species.

In the years 2007 and 2008, the Institute of Parasitology of the University of Zurich tested mice and feacal fox samples in the region of Zurich. About 17% of the mice (100 mice from 634 in 2007 resp. 66 from 393 in 2008) were positive for E. multilocularis. In the fox faecal samples the number of positive samples declined from 26% in 2007 to 19% in 2008 (361/1376 in 2007 resp. 202/1044 in 2008). However fox faecal samples from regions without deworming bait containing praziquantel remained at the level of the previous year (63/254 (25%) samples were positive).

In a dog survey in 2009 in Switzerland the prevalence of E. multilocularis (determined by egg isolation and species specific PCR) was found to be 0% (0.0/0.0-2.5) in 118 randomly collected pet dogs, but 2.4% (0.5 -6.9%) in 124 farm dogs with free access to the surrounding fields. In this study eggs were also isolated from hair samples of all dogs. No taeniid-eggs were found on the surface of pet dogs, but in 2 cases (1.6%) taeniid-eggs were isolated from farm dogs. Species identification in these two cases was not achieved by PCR.
National evaluation of the recent situation, the trends and sources of infection

Generally speaking, an infection of humans with Echinococcus multilocularis, the causative agent in AE, is rare – albeit the increased risk of infection since 2001. Following the steep increase in 2001, the incidence of human AE-cases currently appears to stabilize on this higher level. In contrast to existing perceptions, the majority of cases in Switzerland are diagnosed in urban areas. Also, most areas with increasing incidences can be allocated to areas of core cities and the corresponding agglomeration. Age appears to be an important factor in the development of clinically relevant AE.

The increased risk is thought to be caused by the encroachment of foxes to the urban areas as a consequence of an increased fox population by a factor of 2.6 after having eradicated fox rabies from 1984 to 2000 (mean numbers of foxes shot or found dead: 19'500 from 1977-1987 and 51'500 from 1997-2007). It is estimated that the prevalence of Echinococcus multilocularis in foxes lies between 30% and 70%.

Up to date, no more than 10 cases per year are reported in animals. In 2011, 10 cases were reported to the FVO by the cantonal veterinarians, affecting 8 foxes and 2 dogs. A total of 52 cases of echinococcosis were registered in the last 10 years, most of which occurred in dogs (46%), foxes (33%) and apes (10%).

In 2011, 71 tests for echinococcosis were carried out in veterinary diagnostic laboratories in the context of clinical investigations mainly in dogs (45%) and wild animals (40%), which also contribute most to the positive findings, see table “Echinococcosis in animals”.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

In fresh foodstuffs, outdoor cultivation for example can lead to the occurrence of fox tapeworm eggs, but there are no figures on the degree of contamination of individual foods. Moreover, people can also become infected through contact with soil, shoes and also dogs that are contaminated with fox tapeworm.

Recent actions taken to control the zoonoses

The FVO is funding a project entitled ‘Control of alveolar echinococcosis & management of foxes in urban areas’. New methods in the management of urban foxes are to be tried out along with active communication to encourage dealing with foxes in a way that is appropriate to wild animals.

The Institute of Parasitology of the University of Zurich currently runs a study to control the disease in foxes in the urban area of Zurich. Fox baits are distributed once a month by hand on extended parts of the surrounding of the city. The baits contain the anthelminthic praziquantel for the deworming of the foxes. The method has been proved to be effective, thus areas with bait distribution showed a significant decrease of the E. multilocularis egg contamination. The practicability of the method in a larger scale is under investigation.

Owners from dogs which regularly are hunting mice are encouraged to deworm their dogs regularly (see also www.ESCCAP.ch).

Additional information

1. Information on fox tapeworm: www.paras.uzh.ch/infos and www.ESCCAP.ch.
2. Torgerson, P.R., Schweiger, A., Deplazes, et al., 2008, Alveolar echinococcosis: From a deadly disease to a well-controlled infection. Relative survival and economic analysis in Switzerland over the last
35 years. J. of Hepatol. 49: 72-77


4. Guidelines for deworming of dogs and cats are published for Switzerland under www.ESCCAP.ch by the Expertgroup ESCCAP_CH.

5. Further information can be found on the FVO website www.bvet.admin.ch
### 2.9.2 Echinococcus in animals

#### Table Echinococcus in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Region</th>
<th>Units tested</th>
<th>Total units positive for Echinococcus</th>
<th>E. granulosus</th>
<th>E. multilocularis</th>
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<tr>
<td>Cats - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>5</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogs - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>32</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other animals - Clinical investigations</td>
<td>FVO</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>5</td>
<td>3</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Pigs - Clinical investigations</td>
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<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wild animals - Clinical investigations</td>
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<td>animal sample</td>
<td>Animal</td>
<td>28</td>
<td>13</td>
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<td></td>
</tr>
</tbody>
</table>

**Echinococcus spp., unspecified**

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Units tested</th>
</tr>
</thead>
<tbody>
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<td>Cats - Clinical investigations</td>
<td>0</td>
</tr>
<tr>
<td>Dogs - Clinical investigations</td>
<td>4</td>
</tr>
<tr>
<td>Other animals - Clinical investigations</td>
<td>3</td>
</tr>
<tr>
<td>Pigs - Clinical investigations</td>
<td>1</td>
</tr>
<tr>
<td>Wild animals - Clinical investigations</td>
<td>13</td>
</tr>
</tbody>
</table>

**Comments:**

1) Up to date there is no further differentiation in the ILD among wild animals possible. However, wild animals tested here are mainly foxes.
Table Echinococcus in animals

Footnote:

All data categorised as “clinical investigations” are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of “clinical investigations”.

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>123</td>
</tr>
<tr>
<td>2010</td>
<td>145</td>
</tr>
<tr>
<td>2011</td>
<td>160</td>
</tr>
</tbody>
</table>
2.10 TOXOPLASMOSIS

2.10.1 General evaluation of the national situation

A. Toxoplasmosis general evaluation

History of the disease and/or infection in the country

Toxoplasmosis in humans is not notifiable. Thus, no data on the frequency of human toxoplasmosis are available. It is known, that some sporadic human cases do occur.

In animals, toxoplasmosis is notifiable (TSV, Article 5 and Article 291). Veterinarians and diagnostic laboratories must report any suspected cases of toxoplasmosis to the cantonal veterinarian, who may issue an order for the suspected cases to be investigated. In the past ten years (2002-2011) a total of 19 cases were reported to the FVO by cantonal veterinarians. Never more than 4 cases per year were recorded. 40% of these cases occurred in livestock (mainly goats and sheep), 22% in cats and the remaining 38% in other species.

In 2000, Toxoplasma-DNA in meat-producing animals was present in meat samples in 1% of the assessed cows, 0% of young cattle, 2% of young bulls, 1% of calves, 0% of pigs and 4% of sheep samples. Toxoplasma antibodies could be detected in 32% of cows and young cattle, 21% in young bulls, 4% in calves and 53% in sheep; in the breeding pigs 27% and in the fattening pigs 1% (Wyss et al., 2000). In 2009, again meat from various animal categories was sampled at the slaughterhouse. Using real-time PCR technique it could be shown that DNA of T. gondii was prevalent in 4.7% of bovine samples, 2.2% of porcine samples, 2.0% of sheep samples and 0.7% of wild boar samples (Berger-Schoch et al., 2011). Toxoplasma antibodies could be detected in 13% in calves (6/47), 37% in cattle (48/129), 62% in bulls (62/100) and 53% in cows (69/130). In the fattening pigs it was 14% (7/50), in the free-range pigs 13% (13/100), in the sows 36% (43/120) and in the wild boars 6.7% (10/150). Seroprevalence in the lambs was 33% (33/100) and in the ewes 81% (121/150). The seroprevalence rose significantly with the increasing age of the animals tested, while the housing conditions (conventional fattening pigs versus free-range pigs) appeared to have no influence on the results of serological testing (Berger-Schoch et al., in press). In comparison of the two studies (which is justifiable as the same standardised P-30 ELISA was used and various other studies from abroad have shown that both substrates (serum and meat juice) are directly comparable) the T. gondii seroprevalence in all species rose over the past 10 years. With the switch from the conventional PCR to the real-time system, PCR has become more sensitive, so that the increase in the T. gondii prevalence in meat samples apparent in most species (except sheep) needs to be taken with caution. In addition, the difference in prevalence was only significant in calves. As another source of human infection, faeces of 252 cats was investigated in the same study. Oocytes of T. gondii were found in 0.4% of the samples (Berger-Schoch et al. 2011). Genotyping of the isolates of the survey from 2009 indicated that all 3 genotypes occur in Switzerland (Berger-Schoch et al., 2011).

National evaluation of the recent situation, the trends and sources of infection

Humans become infected by the oral route, either through the uptake of infectious oocysts from the environment or by means of tissue cysts from raw or insufficiently cooked meat. The seroprevalence figures in the new study, which were very high in some cases, show that infections with Toxoplasma gondii in meat-producing animals are widespread in Switzerland and infection with T. gondii was more frequently than was the case 10 years ago. The increasing age of the animals was
identified as a risk factor for Toxoplasma infection.

The low rate of infection in wild boars can most likely be explained by the fact that wild pigs normally live extensively in areas with low cat density.

The oocyst excretion rate of 0.4 % found in cats may appear low. But when one considers that a sick cat may excrete large quantities of oocysts for up to 20 days, and these can survive for a year under favourable conditions (i.e. not too cold, hot or dry), the environmental contamination with T. gondii must not be underestimated.

In 2011, the reported cases in animals by cantonal veterinarians to the FVO were in the range of the past 10 years. A total of 4 cases were reported: one case in cats, 2 in apes and 1 in another zoo animal.

In veterinary diagnostic laboratories 521 tests for toxoplasmosis were carried out in the context of clinical investigations in 2011, mainly in cats (94%).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)
In non-immune sheep and goats (first-time infection) Toxoplasma gondii is regarded as a major cause of abortion and loss of lambs.
There is a risk of exposure in Switzerland both from the consumption of meat and from cats as contaminators of the environment. The risk appears to have increased rather than decreased in the past ten years.

Recent actions taken to control the zoonoses
A national survey on Toxoplasma gondii was conducted in 2009 in order to update the data obtained 10 years ago (results are described in the text above and in the publications mentioned below).
Pregnant women are informed about the recommendations from the FOPH to disclaim on raw or insufficient cooked meat and that caution is generally called for when faced with cat faeces (and potentially contaminated surroundings).

Additional information
4. Further information can be found on the FVO website www.bvet.admin.ch.
### Table Toxoplasma in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Analytical Method</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Toxoplasma</th>
<th>T. gondii</th>
<th>Toxoplasma spp., unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cats - Clinical investigations</td>
<td>FVO</td>
<td>Suspect sampling</td>
<td>Not applicable</td>
<td>animal sample</td>
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<td>Alpacas - Clinical investigations</td>
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</tr>
<tr>
<td>Birds - Clinical investigations</td>
<td>FVO</td>
<td>Suspect sampling</td>
<td>Not applicable</td>
<td>animal sample</td>
<td></td>
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<tr>
<td>Cattle (bovine animals) - Clinical investigations</td>
<td>FVO</td>
<td>Suspect sampling</td>
<td>Not applicable</td>
<td>animal sample</td>
<td></td>
<td>Animal</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogs - Clinical investigations</td>
<td>FVO</td>
<td>Suspect sampling</td>
<td>Not applicable</td>
<td>animal sample</td>
<td></td>
<td>Animal</td>
<td>4</td>
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</tr>
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<td>Goats - Clinical investigations</td>
<td>FVO</td>
<td>Suspect sampling</td>
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<td>Animal</td>
<td>5</td>
<td>0</td>
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</tr>
<tr>
<td>Other animals - Clinical investigations</td>
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<td>Animal</td>
<td>10</td>
<td>3</td>
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<tr>
<td>Pigs - Clinical investigations</td>
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<td>Suspect sampling</td>
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</tr>
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<td>Wild animals - Clinical investigations</td>
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<td>Animal</td>
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</tbody>
</table>

Footnote:

All data categorised as "clinical investigations" are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations". Methods used for Toxoplasma diagnostics: histopathology, immunohistochemistry, PCR as well as the detection of oocyst in case of final hosts.
2.11 RABIES

2.11.1 General evaluation of the national situation

A. Rabies general evaluation

History of the disease and/or infection in the country
Rabies in humans is a notifiable disease. It has to be reported within one day of rabies being clinically suspected by a medical doctor or the Lyssavirus being detected in culture by a laboratory (ordinance of the FDHA on doctor and laboratory reporting).

In the period from 1967 until 1999, an estimated number of some 25,000 postexposure treatments in humans were done due to the increased risk of rabies infections. Rabies caused in 1977 three human deaths.

Rabies in animals falls into the category of an animal disease to be eradicated (TSV, Article 3). According to Articles 142-149 of the animal health ordinance, government action is taken to control the disease. Anyone who sees a wild animal or stray pet that behaves in a way that appears suspiciously like rabies is required to report this to the police, hunting authorities or a veterinarian. Animal keepers must also report pets that behave in a way that is suspiciously like rabies to a veterinarian. (Re-)Import conditions for cats, dogs and ferrets were implemented in 2003 and adapted in 2004 according to the EU regulation 998/2003/EC.

The European fox rabies epizootic starting in 1939 at the eastern border of Poland reached Switzerland on March 3, 1967. In the period from 1967 until 1999 a total of 17,108 rabies cases, of which 73% in foxes and 14% in domestic animals were diagnosed. To eliminate rabies, in 1978 the first field trial world-wide for the oral immunization of foxes against rabies was conducted in Switzerland. Overall, between 1978 and 1998 a total of 2.8 million baits containing a modified live virus were distributed. The 1990s were characterized by a recrudescence of rabies in spite of regular oral immunization of foxes. The last case of fox rabies occurred in 1996. Bat rabies has been diagnosed in 3 cases in the past fifteen years (1992, 1993, 2002). Therefore, bat rabies remains a source, albeit little, of infection for animals and humans.

According to the definitions of the OIE and WHO (no cases for at least two years) the territory of Switzerland is considered to be free of rabies since 1999. A suspected case of rabies in a dog (urban rabies) was confirmed in 2003, but since the dog was a foundling picked up close to the French border with a viral sequence closely related to North African strains from dogs, it does not indicate a focus of rabies infection in Switzerland but an illegal import.

National evaluation of the recent situation, the trends and sources of infection
In 2011 609 sera from humans were tested for neutralizing antibodies at the national reference laboratory for rabies. In 371 cases (61%) antibody titers were controlled after pre-expositional immunization and in 220 of cases (36%) the blood was checked after post exposure prophylaxis (PEP). In 18 cases no reason for the investigation was given.

109 animals were tested for rabies at the national reference laboratory (Swiss Rabies Center) in 2011, none of which were positive. The samples most frequently originated from dogs and cats (39%), bats (25%) and foxes (20%). Additionally, 2483 sera of dogs and cats were tested in the context of travelling procedures in order to detect the level of neutralising antibodies.

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)
Switzerland and most of the neighboring countries were free from European fox rabies in 2011. The import conditions implemented in 2003 reduce the risk of imported rabies cases in domestic animals to a very low level. However, illegal imports as well as bat rabies remain a certain risk to Switzerland.

Recent actions taken to control the zoonoses
Vaccination of dogs is recommended (and common), but not mandatory. (Re-)Import conditions for cats, dogs and ferrets are implemented according to the EU regulation 998/2003/EC. Animals with suspect symptoms originating from countries with urban rabies are tested for rabies. Switzerland prepared itself to react quickly with an oral immunization campaign for foxes in Switzerland close to the Italian border in 2010 if rabies should spread further from Italy to the Swiss border (two foxes were diagnosed positive in October 2008 in northeastern Italy, spread further in 2009 and 2010 to the north of Italy close to the Swiss border (68 cases occurred in 2009 and 149 up to April in 2010). Due to an extensive immunization campaign reaching from the Slovenian to the Swiss border further spread of the outbreak was prevented. The last rabies case was reported in February 2011 in the region Veneto in north Italy.

Additional information
1. Diagnostic/analytical methods used
All test concerning rabies are carried out in the reference laboratory, the Swiss Rabies Center =>http://www.ivv.unibe.ch/Swiss_Rabies_Center/swiss_rabies_center.html). It is authorized by the EU for rabies testing, see http://ec.europa.eu/food/animal/liveanimals/pets/approval_en.htm.
For rabies virus detection immunfluorescence (FAT) and virus isolation using murine neuroblastoma cell culture (RTCIT) is used and the rabies antibody detection is carried out using the rapid fluorescent focus inhibition test (RFFIT) as described in the OIE manual, see http://www.oie.int/eng/normes/mmanual/a_00044.htm.
2. Swiss Rabies Center: http://www.cx.unibe.ch/ivv/Swiss_Rabies_Center/swiss_rabies_center.html
3. Further information can be found on the FVO website www.bvet.admin.ch.
2.11.2 Rabies in humans

Table Lyssavirus (rabies) in humans - Species/serotype distribution

<table>
<thead>
<tr>
<th>Species/serotype Distribution</th>
<th>Cases</th>
<th>Cases Inc.</th>
<th>Autochthon cases</th>
<th>Autochthon Inc.</th>
<th>Imported cases</th>
<th>Imported Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyssavirus (rabies)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lyssavirus (unspecified virus)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
2.11.3 Lyssavirus (rabies) in animals

A. Rabies in dogs

Monitoring system
Case definition
An animal is rabies diseased if the analytical method (see additional information below) gives a positive result.

Vaccination policy
Vaccination of the Swiss dog population is recommended (and common), but not mandatory.

Other preventive measures than vaccination in place
(Re-)Import conditions for cats, dogs and ferrets according to the EU regulation 998/2003/EC.

Notification system in place
Rabies in animals falls into the category of an animal disease to be eradicated (TSV, Article 3). According to Articles 142-149 of the animal health ordinance, government action is taken to control the disease. Animal keepers must report pets that behave in a way that is suspiciously like rabies to a veterinarian.

Additional information
1. Diagnostic/analytical methods used
For rabies virus detection immunfluorescence (FAT) and virus isolation using murine neuroblastoma cell culture (RTCIT) is used and the rabies antibody detection is carried out using the rapid fluorescent focus inhibition test (RFFIT) as described in the OIE manual, see http://www.oie.int/eng/normes/mmanual/a_00044.htm.
2. Swiss Rabies Center: http://www.cx.unibe.ch/ivv/Swiss_Rabies_Center/swiss_rabies_center.html
## Table Rabies in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Region</th>
<th>Units tested</th>
<th>Total units positive for Lyssavirus (rabies)</th>
<th>Rabies virus (RABV)</th>
<th>EBLV-1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle (bovine animals)</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Sheep</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Solipeds, domestic</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Badgers - wild</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Bats - wild</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>28</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Cats</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>9</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Deer - wild - fallow deer</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Dogs</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>33</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Foxes - wild</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>22</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Marten - wild</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Raccoon dogs - wild</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Rats</td>
<td>Swiss Rabies Center</td>
<td>Unspecified</td>
<td>Not applicable</td>
<td>animal sample</td>
<td>Animal</td>
<td>Schweiz/Suis se/Svizzera</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cattle (bovine animals)</th>
<th>EBLV-2</th>
<th>Lyssavirus (unspecified virus)</th>
</tr>
</thead>
</table>

| |
|---|---|---|
| Cattle (bovine animals) | | |
### Table Rabies in animals

<table>
<thead>
<tr>
<th>Animal Type</th>
<th>EBLV-2</th>
<th>Lyssavirus (unspecified virus)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solipeds, domestic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Badgers - wild</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bats - wild</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cats</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deer - wild - fallow deer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dogs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Foxes - wild</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marten - wild</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Raccoon dogs - wild</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rats</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.12 STAPHYLOCOCCUS INFECTION

2.12.1 General evaluation of the national situation

2.12.2 Staphylococcus in animals

Table Staphylococcus in Animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Sampling unit</th>
<th>Sample weight</th>
<th>Units tested</th>
<th>Total units positive for Staphylococcus</th>
<th>S. aureus, meticillin resistant (MRSA)</th>
<th>S. aureus, meticillin resistant (MRSA) - spa-type t011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle (bovine animals) - dairy cows - adult (Bulktankmilk samples)</td>
<td>Objective sampling</td>
<td>Official sampling</td>
<td>animal sample &gt; milk</td>
<td>Herd</td>
<td></td>
<td></td>
<td>200</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active</td>
<td>Objective sampling</td>
<td>Official sampling</td>
<td>animal sample &gt; nasal swab</td>
<td>Animal</td>
<td></td>
<td></td>
<td>392</td>
<td>22</td>
<td>22</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source of information</th>
<th>S. aureus, meticillin resistant (MRSA) - spa-type t010</th>
<th>S. aureus, meticillin resistant (MRSA) - spa-type t034</th>
<th>S. aureus, meticillin resistant (MRSA) - MRSA, unspecified</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cattle (bovine animals) - dairy cows - adult (Bulktankmilk samples)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pigs - fattening pigs - unspecified - weaners to growers - at slaughterhouse - Monitoring - active</td>
<td>19</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comments:

1) Bulktankmilk samples
Table Staphylococcus in Animals

Footnote:
1 MRSA isolates from pigs belonged to spa-type t208, 1 to spa-type t2279
2.12.3 Antimicrobial resistance in Staphylococcus isolates

A. Antimicrobial resistance of S. aureus in Animals Pigs - fattening pigs - at slaughterhouse - Monitoring - active

Sampling strategy used in monitoring

Frequency of the sampling
A random sample of 392 fattening pigs were investigated at slaughter using nasal swabs. The slaughter plants included in the monitoring program accounted for over 85% of the total production of pigs in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. The samples were taken by the competent authority in the framework of the antimicrobial resistance monitoring. The samples were taken evenly distributed over the year, in order to exclude seasonal effects.

Type of specimen taken
Nasal swabs

Methods of sampling (description of sampling techniques)
Samples were taken using transport swabs (Oxoid Ltd, Basingstoke, England) from the nares of the pigs subsequent to stunning by officials of the Swiss abattoir authorities. They were transported to the laboratory immediately after sampling without cooling.

Procedures for the selection of isolates for antimicrobial testing
From each positive sample one MRSA isolate was submitted to susceptibility testing.

Methods used for collecting data
All samples were analyzed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates
Swabs were transferred into tubes containing 10 ml Mueller Hinton Broth supplemented with 6.5% NaCl and incubated aerobically at 37°C for 24 h under agitation. One ml from this pre-enrichment was inoculated into 9 ml tryptone soy broth containing 3.5 mg/L cefoxitin and 75 mg/L aztreonam, and further incubated aerobically at 37°C for 24 h. A loopful was then spread onto MRSA selective agar plates (BBL CHROMagar™ MRSA; Becton Dickinson, Franklin Lakes, NJ), which were incubated at 37°C for 24 h. Pink to mauve-colored colonies were regarded as suspicious and five presumptive colonies were cultivated onto tryptone soy agar plates containing 5% sheep blood (TSA-SB) (Oxoid Ltd, Basingstoke, England) at 37°C for 24 h. S. aureus was identified using Vitek 2 with Gram-Positive (GP) cards (BioMérieux, Mary l'Etoile, France) following manufacturer's recommendations.

Laboratory used for detection for resistance

Antimicrobials included in monitoring
chloramphenicol, ciprofloxacin, clindamycin, erythromycin, fusidic acid, genatmicin, kanamycin, linezolid, mupirocin, oxacillin, penicillin, quinuprisitin/dalfoprisitin, rifampin, tetracyclin, trimethoprim, tiamulin, streptomycin, sulfamethoxazol, vancomycin

Cut-off values used in testing
Resistance was defined following the epidemiological cut-off values published by the European Committee on Antimicrobial Susceptibility Testing (EUCAST).
Preventive measures in place

None

Control program/mechanisms

The control program/strategies in place

None

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

MRSA prevalence in fattening pigs was 5.6% (95%CI 3.6 - 8.4). 19 isolates belonged to the genotype ST398-t034-V, 1 to the genotype ST398-t011-V, 1 to the genotype ST49-t208-V and 1 to the genotype ST1-t2279-IVc. 15 isolates belonging to the most commonly detected genotype ST398-t034-V shared an identical resistance profile. They showed resistance to ß-lactams, tetracycline, macrolides, lincosamides, trimethoprim, pleuromutilins, streptomycin and quinupristin/dalfopristin. Three additional isolates were resistant to all these antimicrobials except streptomycin whereas one isolate had additional resistance to all tested aminoglycosides.

National evaluation of the recent situation, the trends and sources of infection

In 2009, the prevalence of MRSA in Swiss slaughter pigs was 2.2% (95%CI 1.0-4.2) with 8 of 405 pig nasal samples being positive. It increased significantly to 5.9% in 2010 with 23 of 392 nasal swabs containing MRSA. Compared to the situation in other European countries, the MRSA prevalence in Swiss livestock is still low.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

The increased MRSA prevalence in fattening pigs is giving cause for a certain concern. The monitoring of the situation will be continued. People in close contact with animals have been shown to have a higher risk of carrying MRSA. In a study carried out in 2009 no MRSA were found on food of animal origin in Switzerland.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
Switzerland - 2011 Report on trends and sources of zoonoses

B. Antimicrobial resistance of S. aureus in Animals Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk samples)

Sampling strategy used in monitoring

Frequency of the sampling
In the milk-testing scheme in Switzerland, BTM samples are routinely collected twice a month from all dairy farms and subsequently subjected to quality testing in a single laboratory. In November 2011, 200 BTM samples were randomly collected at this Laboratory. All samples were taken in the first two weeks of November 2011 in order to exclude the possibility that one farm could be sampled twice.

Type of specimen taken
Bulk Tank milk (BTM)

Methods of sampling (description of sampling techniques)
The BTM samples are automatically collected on each farm by milk-collection tankers along the milk collecting routes. A large number of farms are also sampled manually at milk collection locations, at dairies and at milk collecting or centrifugation plants. Specially-trained professionals take the samples in accordance with the international standards of the International Dairy Federation (IDF) and the Swiss law. BTM samples are refrigerated at 1 – 5°C and sent to a single laboratory for the milk inspection analyses, where a smaller sample is randomly taken and immediately sent to the ZOBA.

Procedures for the selection of isolates for antimicrobial testing
From each positive sample one methillin-sensible Staph. aureus (MSSA) and one methicillin-resistant Staph. aureus (MRSA) was submitted to susceptibility testing.

Methods used for collecting data
All samples were analyzed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates
MSSA: Method with preenrichment following direct plating on selective agar. Confirmation of S.aureus phenotypically.
MRSA: Method with preenrichment following enrichment and plating on selective agar. Confirmation of S.aureus phenotypically and detection of mecA gene by PCR.

Laboratory used for detection for resistance
Antimicrobials included in monitoring
chloramphenicol, ciprofloxacin, clindamycin, erythromycin, fusidic acid, genatmicin, kanamycin, linezolid, mupirocin, oxacillin, penicillin, quinuprisitin/dalfoprisitn, rifampin, tetracyclin, trimethoprim, tiamulin, streptomycin, sulfamethoxazol, vancomycin

Cut-off values used in testing
Resistance was defined following the epidemiological cut-off values published by the Europaean Committee on Antimicrobial Susceptibility Testing (EUCAST).

Preventive measures in place
None

Control program/mechanisms
The control program/strategies in place
None

Measures in case of the positive findings or single cases
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None

Notification system in place

None

Results of the investigation

31 MSSA (15.5%, 95%CI 10.8-21.3%) and 3 MRSA (1.5%, 95%CI 0.5-4.3%) were isolated. 58% of all MSSA isolates were fully susceptible to all tested antimicrobials, none were resistant to more than 4 antimicrobials. Resistance against penicillin (22.6%) was most often found. One MRSA Isolate showed resistance to 10 of the 19 tested antimicrobials. The 2 other MRSA isolates were both resistant against oxacillin, penicillin, gentamicin, kanamycin, tetracycline and trimethoprim. All three MRSA isolates belonged to spa type t-011.

National evaluation of the recent situation, the trends and sources of infection

It was the first time that BTM samples were used in the Swiss antibiotic resistance monitoring. The sampling of BTM turned out to be easy and cost effective. However to get more accurate results and to be able to find trends of resistance or newly emerging resistances with a certain confidence, there should be tested far more BTM samples.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

In the last years a steady increase in the use of cephalosporins has been noticed in Switzerland especially for the treatment of mastitis during lactation. This use could have an influence on resistance in indicator and zoonotic bacteria in the environment of dairy farms – a setting that is not well covered by the existing monitoring of antimicrobial resistance in Switzerland. The routine monitoring of bacteria obtained from bulk tank milk (BTM) could be a convenient tool for detecting trends in antimicrobial resistance on dairy farms.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
Table Antimicrobial susceptibility testing of Staphylococcus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample)

<table>
<thead>
<tr>
<th>Staphylococcus</th>
<th>S. aureus</th>
<th>S. aureus, meticillin resistant (MRSA) - spa-type t011</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
<td>yes</td>
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<tr>
<td>Isolates out of a monitoring program (yes/no)</td>
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<tr>
<td>Number of isolates available in the laboratory</td>
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Antimicrobials:

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<th>N</th>
<th>n</th>
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</thead>
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<td>Aminoglycosides - Gentamicin</td>
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</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
<td>31</td>
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<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>31</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>31</td>
<td>1</td>
<td>3</td>
<td>0</td>
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<td>Fluoroquinolones - Ciprofloxacin</td>
<td>31</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>31</td>
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<td>3</td>
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</tr>
<tr>
<td>Trimethoprim</td>
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<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Antimycobacterial drugs - Rifampicin</td>
<td>31</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Fully sensitive</td>
<td>31</td>
<td>18</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Fusidanes - Fusidic acid</td>
<td>31</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>31</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Lincosamides - Clindamycin</td>
<td>31</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>31</td>
<td>0</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>31</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Penicillins - Oxacillin</td>
<td>31</td>
<td>0</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Penicillins - Penicillin</td>
<td>31</td>
<td>7</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Pleuromutilins - Tiamulin</td>
<td>31</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Resistant to 1 antimicrobial</td>
<td>31</td>
<td>9</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
Table Antimicrobial susceptibility testing of Staphylococcus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample)

<table>
<thead>
<tr>
<th>Staphylococcus</th>
<th>S. aureus</th>
<th>S. aureus, meticillin resistant (MRSA) - spa-type t011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolates out of a monitoring program (yes/no)</td>
<td>N</td>
<td>yes</td>
</tr>
<tr>
<td>Number of isolates available in the laboratory</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td></td>
<td>31</td>
<td>3</td>
</tr>
</tbody>
</table>

Antimicrobials:

- Resistant to 2 antimicrobials: 31 2 3 0
- Resistant to 3 antimicrobials: 31 1 3 0
- Resistant to 4 antimicrobials: 31 1 3 0
- Resistant to >4 antimicrobials: 31 0 3 3
- Streptogramins - Quinupristin/Dalfopristin: 31 1 3 1
- Sulfonamides - Sulfamethoxazol: 31 2 3 1
Table Antimicrobial susceptibility testing of Staphylococcus in Pigs - fattening pigs - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - nasal swab

<table>
<thead>
<tr>
<th>Staphylococcus</th>
<th>S. aureus, meticillin resistant (MRSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolates out of a monitoring program (yes/no)</td>
<td>yes</td>
</tr>
<tr>
<td>Number of Isolates available in the laboratory</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>22 2</td>
</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
<td>22 2</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>22 18</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>22 0</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>22 1</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>22 22</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>22 20</td>
</tr>
<tr>
<td>Antimycobacterial drugs - Rifampicin</td>
<td>22 0</td>
</tr>
<tr>
<td>Fully sensitive</td>
<td>22 0</td>
</tr>
<tr>
<td>Fusidanes - Fusidic acid</td>
<td>22 0</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>22 0</td>
</tr>
<tr>
<td>Lincosamides - Clindamycin</td>
<td>22 19</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>22 20</td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>22 0</td>
</tr>
<tr>
<td>Penicillins - Oxacillin</td>
<td>22 22</td>
</tr>
<tr>
<td>Penicillins - Penicillin</td>
<td>22 22</td>
</tr>
<tr>
<td>Pleuromutilins - Tiamulin</td>
<td>22 20</td>
</tr>
<tr>
<td>Resistant to 1 antimicrobial</td>
<td>22 0</td>
</tr>
</tbody>
</table>
Table Antimicrobial susceptibility testing of Staphylococcus in Pigs - fattening pigs - at slaughterhouse - Monitoring - active - Objective sampling - Official sampling - animal sample - nasal swab

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>N</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistant to 2 antimicrobials</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Resistant to 3 antimicrobials</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Resistant to 4 antimicrobials</td>
<td>22</td>
<td>0</td>
</tr>
<tr>
<td>Resistant to &gt;4 antimicrobials</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
<td>22</td>
<td>1</td>
</tr>
</tbody>
</table>

**Isolates out of a monitoring program (yes/no)**

<table>
<thead>
<tr>
<th>S. aureus, meticillin resistant (MRSA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
</tr>
</tbody>
</table>

**Number of isolates available in the laboratory**

| 22 | 0 |
Table Antimicrobial susceptibility testing of S. aureus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Isolates out of a monitoring program (yes/no)</td>
</tr>
<tr>
<td></td>
<td>Number of isolates available in the laboratory</td>
</tr>
<tr>
<td></td>
<td>Cut-off value</td>
</tr>
<tr>
<td>S. aureus</td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>2</td>
</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
<td>8</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>16</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>16</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>1</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>1</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>2</td>
</tr>
<tr>
<td>Antimycobacterial drugs - Rifampicin</td>
<td>0.032</td>
</tr>
<tr>
<td>Fusidanes - Fusidic acid</td>
<td>0.5</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>2</td>
</tr>
<tr>
<td>Lincosamides - Clindamycin</td>
<td>0.25</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>1</td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>4</td>
</tr>
<tr>
<td>Penicillins - Oxacillin</td>
<td>2</td>
</tr>
<tr>
<td>Penicillins - Penicillin</td>
<td>0.125</td>
</tr>
<tr>
<td>Pleuromutilins - Tiamulin</td>
<td>2</td>
</tr>
<tr>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
<td>1</td>
</tr>
<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
<td>128</td>
</tr>
</tbody>
</table>
Table Antimicrobial susceptibility testing of S. aureus in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]
### Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) in Pigs - fattening pigs - at slaughterhouse - Monitoring - active

**Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]**

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Isolates out of a monitoring program (yes/no)</th>
<th>Number of isolates available in the laboratory</th>
<th>Pigs - fattening pigs - at slaughterhouse - Monitoring - active</th>
</tr>
</thead>
<tbody>
<tr>
<td>S. aureus, meticillin resistant (MRSA)</td>
<td>yes</td>
<td>22</td>
<td></td>
</tr>
</tbody>
</table>

#### Antimicrobials:

| Cut-off value | N | n | <=0.008 | 0.015 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | 2048 | >2048 | lowest | highest |
|---------------|---|---|---------|-------|------|------|------|------|-----|---|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Aminoglycosides - Gentamicin | 2 | 22 | 2 | 19 | 1 | 1 | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 16 |
| Aminoglycosides - Kanamycin | 8 | 22 | 2 | 19 | 1 | 1 | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 4 | 64 |
| Aminoglycosides - Streptomycin | 16 | 22 | 18 | 2 | 2 | 1 | 17 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 4 | 32 |
| Aminoglycosides - Sulfamethoxazol | 16 | 22 | 0 | 1 | 21 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 4 | 64 |
| Fluorquinolones - Ciprofloxacin | 1 | 22 | 1 | 8 | 13 |  | 1 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.25 | 1 |
| Tetracyclines - Tetracycline | 1 | 22 | 22 | 2 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.25 | 16 |
| Trimethoprim | 2 | 22 | 20 | 2 | 20 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 2 | 32 |
| Aminocyclines - Rifampicin | 0.032 | 22 | 0 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.015 | 0.25 |
| Fusidanes - Fusidic acid | 0.5 | 22 | 0 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.5 | 4 |
| Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin | 2 | 22 | 0 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 2 |
| Lincosamides - Clindamycin | 0.25 | 22 | 19 | 2 | 19 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.125 | 4 |
| Macrolides - Erythromycin | 1 | 22 | 20 | 1 | 1 | 20 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.25 | 8 |
| Oxazoldiones - Linezolid | 4 | 22 | 0 | 1 | 15 | 6 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 1 | 8 |
| Penicillins - Oxacillin | 2 | 22 | 22 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.25 | 8 |
| Penicillins - Penicillin | 0.125 | 22 | 22 | 22 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.125 | 2 |
| Pleuromutilins - Tiamulin | 2 | 22 | 20 | 2 | 20 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.25 | 8 |
| Streptogramins - Quinupristin/Dalfopristin | 1 | 22 | 19 | 1 | 2 | 4 | 11 | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 0.5 | 4 |
| Sulfonamides - Sulfamethoxazol | 128 | 22 | 1 | 21 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | 64 | 512 |
Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) in Pigs - fattening pigs - at slaughterhouse - Monitoring - active
- Objective sampling - Official sampling - animal sample - nasal swab - quantitative data [Dilution method]
### Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t011 in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</th>
</tr>
</thead>
<tbody>
<tr>
<td>spa-type t011</td>
<td></td>
</tr>
<tr>
<td>Isolates out of a monitoring program (yes/no)</td>
<td>yes</td>
</tr>
<tr>
<td>Number of isolates available in the laboratory</td>
<td>3</td>
</tr>
<tr>
<td>Antimicrobials:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cut-off value</td>
</tr>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>2</td>
</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
<td>8</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>16</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>16</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>1</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>1</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>2</td>
</tr>
<tr>
<td>Antimycobacterial drugs - Rifampicin</td>
<td>0.032</td>
</tr>
<tr>
<td>Fusidanes - Fusidic acid</td>
<td>0.5</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>2</td>
</tr>
<tr>
<td>Lincomamides - Clindamycin</td>
<td>0.25</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>1</td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>4</td>
</tr>
<tr>
<td>Penicillins - Oxacillin</td>
<td>2</td>
</tr>
<tr>
<td>Penicillins - Penicillin</td>
<td>0.125</td>
</tr>
<tr>
<td>Pleuromutilins - Tiamulin</td>
<td>2</td>
</tr>
<tr>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
<td>1</td>
</tr>
</tbody>
</table>
### Table Antimicrobial susceptibility testing of S. aureus, meticillin resistant (MRSA) - spa-type t011 in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk sample) - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>spa-type t011</th>
<th>Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active (Bulk tank milk sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>yes</td>
</tr>
<tr>
<td>Antimicrobials:</td>
<td></td>
</tr>
<tr>
<td>Sulfonamides - Sulfamethoxazol</td>
<td></td>
</tr>
<tr>
<td>Cut-off value</td>
<td>N</td>
</tr>
<tr>
<td>128</td>
<td>3</td>
</tr>
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</table>
### Table Cut-off values for antibiotic resistance testing of Staphylococcus in Animals

<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broth dilution</td>
<td>EUCAST</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Concentration (microg/ml)</th>
<th>Zone diameter (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Standard</td>
<td>Resistant &gt;</td>
</tr>
<tr>
<td>Aminoglycosides</td>
<td>Gentamicin</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Kanamycin</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Streptomycin</td>
<td>16</td>
</tr>
<tr>
<td>Amphenicols</td>
<td>Chloramphenicol</td>
<td>16</td>
</tr>
<tr>
<td>Fluoroquinolones</td>
<td>Ciprofloxacin</td>
<td>1</td>
</tr>
<tr>
<td>Penicillins</td>
<td>Oxacillin</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Penicillin</td>
<td></td>
</tr>
<tr>
<td>Sulfonamides</td>
<td>Sulfamethoxazol</td>
<td>128</td>
</tr>
<tr>
<td>Tetracyclines</td>
<td>Tetracycline</td>
<td>1</td>
</tr>
<tr>
<td>Trimethoprim</td>
<td>Trimethoprim</td>
<td>2</td>
</tr>
<tr>
<td>Lincosamides</td>
<td>Clindamycin</td>
<td>0.25</td>
</tr>
<tr>
<td>Macrolides</td>
<td>Erythromycin</td>
<td>1</td>
</tr>
<tr>
<td>Fusidanes</td>
<td>Fusidic acid</td>
<td>0.5</td>
</tr>
<tr>
<td>Class</td>
<td>Drug</td>
<td>Concentration (μg/ml)</td>
</tr>
<tr>
<td>------------------------------</td>
<td>-----------------------</td>
<td>-----------------------</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides)</td>
<td>Vancomycin</td>
<td>2</td>
</tr>
<tr>
<td>Pleuromollins</td>
<td>Tiamulin</td>
<td>0.032</td>
</tr>
<tr>
<td>Antimycobacterial drugs</td>
<td>Rifampicin</td>
<td>1</td>
</tr>
<tr>
<td>Streptogramins</td>
<td>Quinupristin-Dalfopristin</td>
<td>4</td>
</tr>
<tr>
<td>Oxazolidines</td>
<td>Linezolid</td>
<td></td>
</tr>
</tbody>
</table>

Table: Cut-off values for antibiotic resistance testing of Staphylococcus in Animals
2.13 Q-FEVER

2.13.1 General evaluation of the national situation

A. Coxiella burnetii (Q-fever) general evaluation

History of the disease and/or infection in the country

Because Q fever (pathogen: Coxiella burnetii) in humans is not a notifiable disease since 1999, there are no current data on the frequency of this disease in humans. Mandatory reporting was stopped as only few cases were reported: from 1992 until 1998 it were between 10 and 18 cases per year. 1989 until 1991 reported case numbers were higher, ranging between 32 and 52 cases per year. A big outbreak occurred back in 1983 when 12 flocks of sheep apparently shedding C. burnetii were descending from alpine pastures. About 415 people which lived close to the village roads the sheep passed through were infected.

Screening of C. burnetii using PCR in various foodstuff (bovine, ovine, caprine milk and egg shells) in the years 2005-2006 showed that C. burnetii could only be detected in bovine milk (17 of 359 (4.7%) samples or 8 from 27 (29.6%) farms). 504 egg shells, 81 samples from 13 sheep farms and 39 samples of 39 goat farms tested negative.

Coxiellosis in animals is notifiable. In March 2009 it was re-categorised from a diseases to be controlled into a disease to be monitored (TSV, Article 5). Coxiella burnetii plays a certain role as a causative pathogen for abortions in biungulate animals. Abortions in cattle after three months of pregnancy have to be reported to a veterinarian (TSV, Articles 217-221). In sheep, goats and pigs every abortion must be reported. If more than one animal in a holding of ruminants aborts within the space of four months, or if an abortion occurs in a dealer’s stable or during alpine pasturing, then cattle, sheep and goats amongst other also undergo laboratory investigation for Coxiella burnetii (TSV, Article 129). If clinically suspected cases are confirmed by laboratory diagnostic tests, the cantonal veterinary office is notified. Especially at the beginning of the 1990s numbers per year were high with about 100 reported cases a year. Until the mid 1990s numbers declined to roughly 70 cases per year and decreased further to about 40 cases per year in the period 1996 until 2005. In 2006 reported coxiellosis cases rose again to the level of around 70 cases per year and stayed at this higher level up to 2011. In the past ten years 583 coxiellosis cases were reported to the FVO by cantonal veterinarians, 82% of which occurred in cattle, 11% in goats and 6% in sheep.

The total number of C. burnetii-related abortions reported every year is low; in cattle 30–60 cases are recorded every year, while in sheep and goats only isolated cases are reported. This situation is also reflected in data on seroprevalence of the pathogen, which has been found in studies from the Swiss reference laboratory to be about 30% in cattle and about 1–3% in sheep and goats.

National evaluation of the recent situation, the trends and sources of infection

In 2011, 78 cases of coxiellosis in ruminants (72 in cattle, 5 in goats and 1 in sheep) were reported to the FVO by cantonal veterinarians, which is within the range of the past 6 years, however with a very slight tendency to increase in the last 3 years.

In veterinary diagnostic laboratories 2865 tests for Coxiella spp. were carried out in the context of clinical
investigations. Samples were derived from cattle (90%), sheep (5%) and goats (4%), most due to abortions (70%).

Relevance of the findings in animals, feedingstuffs and foodstuffs to human cases (as a source of infection)

The role of Coxiella burnetii as abortion cause among ruminants is mainly of significance for cattle. Infected cattle are less dangerous for humans than infected sheep. The risk of a high epidemic appearance seems to be small for Switzerland.

Recent actions taken to control the zoonoses

Efforts to strengthen disease awareness as well as to improve knowledge how to avoid infection are ongoing.

Additional information

3. Further information can be found on the FVO website www.bvet.admin.ch.
### 2.13.2 Coxiella (Q-fever) in animals

<table>
<thead>
<tr>
<th>Source of information</th>
<th>Sampling strategy</th>
<th>Sampler</th>
<th>Sample type</th>
<th>Sample Origin</th>
<th>Analytical Method</th>
<th>Sampling unit</th>
<th>Units tested</th>
<th>Total units positive for Coxiella (Q-fever)</th>
<th>C. burnetii</th>
<th>No of clinically affected herds</th>
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</thead>
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<tr>
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<tr>
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<td>Animal</td>
<td>6</td>
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<td></td>
<td></td>
</tr>
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</table>

Footnote:

All data categorised as "clinical investigations" are summaries of data from the ILD (Informationssystem Labordiagnostik = information system of laboratory data). ILD is run by the FVO and all labs, which are approved for the diagnosis of certain diseases have to report their results in this system. Only tests on antigen detection are selected for the zoonoses reporting in the context of "clinical investigations". For Coxiella burnetii diagnostics direct detection of the bacteria and PCR were used.
2.14 TULARAEMIA

2.14.1 General evaluation of the national situation

2.14.2 Francisella in animals

A. Francisella in Animals

Notification system in place

Tularaemia is notifiable in animals and in humans.

In humans the number of reported cases per year are still very low, although since 2007 numbers seemed to have slightly increased to a level of more than 10 cases per year (before 2007 cases were always below 10).

In animals, in the past ten years no more than 3 cases were reported. In total 11 cases occurred, 9 in hares and two in monkeys.

Results of the investigation

In 2011, 15 cases in humans were registered (compared to 13 in the year 2010).
In animals, 3 cases in hares were reported to the FVO by the cantonal veterinarians.
In diagnostic laboratories 11 animals were tested (6 hares, 1 cat and 4 other animals).

National evaluation of the recent situation, the trends and sources of infection

No active surveillance is performed in animals. Monitoring is based on voluntary testing of wild animals found dead or hunted as well as animals showing clinical signs typical for tularaemia.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Tularaemia affects mainly wild animals, especially hares and also zoo animals. Contact to wild animals (carrier of F. tularensis and possible reservoir) seems to be an important source of infections to humans. Other sources of infection can be bites of ticks or insects as well as the inhalation of dust/aerosol. Those at risk are mainly gamekeepers, hunters, people who work in agriculture or forestry, veterinary practitioners for wild animals and laboratory staff.

The slight increase in reported cases since 2007 might be the result of improved disease awareness as well as changed diagnostic methods (use of PCR for confirmation).

Additional information

1. Further information can be found on the FVO website www.bvet.admin.ch.
2.15 CYSTICERCOSIS, TAENIOSIS

2.15.1 General evaluation of the national situation

2.15.2 Cysticerci in animals

A. Cysticerci in Animals

Monitoring system

Sampling strategy

Cattle, small ruminants and swine are inspected at slaughter for lesions of Cysticerci.
According to the ordinance of the Federal Department of Economic Affairs (FDEA) of 23 November 2005 on hygiene in the slaughter process (VhyS; SR 817.190.1), all cattle older than 6 months must be checked with incisions into the jaw muscles and heart.

Measures in case of the positive findings or single cases

Carcasses with mild lesions are frozen, carcasses with massive lesions condemned.

Results of the investigation

Studies in six Swiss abattoirs in 2002 until 2005 have shown that the frequency of cestode larvae has remained constant in these years. It revealed, that in the slaughter of large livestock a total average of 0.58% of animals were found to be infested with cestode larvae (data from some abattoirs are missing for individual years). In all cases, the animals most heavily infested were clearly cows.
The FLEKO (= meat inspection statistics) contains data on carcasses which needed to be condemned due to cysticerci. In the time period 2006 until 2011 in total 151 carcasses with massive lesions (which means about 30 each year) were condemned. 77% of these carcasses were cattle, 17% sheep, 5% pigs and 1% goats.

National evaluation of the recent situation, the trends and sources of infection

Cysticercosis in humans is not notifiable. Thus there are no data available.
Numbers of carcasses which needed to be condemned due to massive lesions of cysticerci are constant since many years.
In a case-control study with data from May 2005 until April 2006 the role of possible risk factors for bovine cysticercosis was investigated at livestock level. Statistically significant risk factors are considered to be pastures bordering a railway line, the location of the pasture close to a recreational area with parking spaces and leisure activities, and also farmyard visitors and raw feed that has been bought in. This study showed that the risk is thus primarily dependent on external factors. But in heavily infested cases, other aspects may also play a role, such as not being connected up to the sewage system or the presence of a tapeworm carrier on the farm.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

The illness in humans is mostly of a mild character and can be treated.
The sensitivity of the used methods at slaughter is estimated to be around 10–30 %, meaning that only a
fraction of infested slaughter cattle are identified during meat inspection using the specified methodology.

Additional information

2. Further information can be found on the FVO website www.bvet.admin.ch.
3. INFORMATION ON SPECIFIC INDICATORS OF ANTIMICROBIAL RESISTANCE
3.1 ESCHERICHIA COLI, NON-PATHOGENIC

3.1.1 General evaluation of the national situation

3.1.2 Antimicrobial resistance in Escherichia coli, non-pathogenic

A. Antimicrobial resistance of E.coli in animal

Sampling strategy used in monitoring

Frequency of the sampling

E. coli were analysed for antimicrobial resistance in 206 samples from fattening pigs, 200 samples from cattle and 214 samples from broiler herds. The samples were evenly collected throughout the year in a stratified and randomized sample scheme in the framework of a permanent national monitoring programme on antimicrobial resistance in Swiss food-producing animals. The slaughter plants included in the surveillance programme account for >92% of the total broiler, > 85% of the total pig and > 80% of the total cattle production in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. 178 of these samples from broilers, 175 of these samples from fattening pigs and 174 of these samples from cattle were additionally screened for ESBL/AmpC producers by selective methods.

Additionally 200 bulk tank milk (BTM) samples were randomly collected at the Laboratory, where milk samples from all dairy farms of Switzerland are routinely subjected to quality testing twice a month. The sampling took place during 2 weeks in November 2011 in order to exclude the possibility that one farm could be sampled twice.

Type of specimen taken

Faecal samples from pigs and cattle, cloacal samples from broilers. BTM samples from dairy cows.

Methods of sampling (description of sampling techniques)

Faecal samples from calves and pigs and 5 cloacal samples from different broilers per slaughter batch were taken at the slaughter line using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were brought to the laboratory for analysis. Cloacal swabs from one slaughter batch were pooled at the laboratory.

The BTM samples are automatically collected on each farm by milk-collection tankers along the milk collecting routes. A large number of farms are also sampled manually at milk collection locations, at dairies and at milk collecting or centrifugation plants. Specially-trained professionals take the samples in accordance with the international standards of the International Dairy Federation (IDF) and the Swiss law. BTM samples are refrigerated at 1 – 5°C and sent to a single laboratory for the milk inspection analyses, where a smaller sample is randomly taken and immediately sent to the ZOBA.

Procedures for the selection of isolates for antimicrobial testing

From each sample positive for E. coli or ESBL/AMpC producer one isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).
Laboratory methodology used for identification of the microbial isolates

Samples were cultured for E. coli within 72 h after sampling using standard microbiological procedures.

For detection of ESBL/AmpC producers the faecal/pooled cloacal swabs were transferred into 5ml of MacConkey broth (Oxoid) containing ceftazidime (4mg/L) and incubated at 37°C for 24h under agitation. Then, 1 full loop was plated onto selective chromogenic medium for the screening of third generation cephalosporin-resistant Enterobacteriaceae (chromID ESBL, bioMérieux) and reincubated over night. From each selective plate, a single colony from those showing a unique color an morphology as described in the manufacturers product documentation was further indentified to species level wit Vitek2 system on AST-GN38 cards.

Laboratory used for detection for resistance

Antimicrobials included in monitoring

For E.coli/ unselective method:
ampicillin, cefotaxime, ceftazidime, chloramphenicol, ciprofloxacin, colistin, florfenicol, gentamicin, kanamycin, nalidixic acid, sulfamethoxazole, streptomycin, trimethoprim, tetracycline

For ESBL/AmpC producing E.coli/selective method:
ampicillin, cefazolin, cefepime, cefotaxime, cefotaxime / clavulic acid, cefoxitin, cefpodoxime, ceftazidime, ceftazidime / clavulanic acid, ceftriaxon, cephalotin, ciprofloxacin, gentamicin, imipinem, meropenem, piperacillin / tazobactam

Cut-off values used in testing

E.coli: Wherever possible the epidemiological cut-off values according to EUCAST were used.
ESBL/AmpC producer: CLSI M100-S21

Preventive measures in place

No specific measures for antimicrobial resistance in E. coli. General preventive measures include education of veterinarians and farmers and limitation of use of antimicrobials to veterinary prescription.

Measures in case of the positive findings or single cases

None

Notification system in place

None

Results of the investigation

176 isolates from broiler herds, 175 isolates from pigs, 164 isolates from cattle and 18 isolates from BTM were subjected to susceptibility testing. Resistance is common in E. coli from all three animal species. The highest levels of resistance were found for tetracycline, sulfamethoxazole, streptomycin, ampicillin and trimethoprim. In broilers levels of resistance were also high for ciprofloxacin and nalidixic acid (35% for both). In BTM high levels of resistance were found for ampicillin and streptomycin (28%) and moderate levels for kanamycin, sulfamehtoxazol, tetracycline and trimethoprim (11 - 17%).

With the unselective culture methode four ESBL producing E. coli from broilers and one from pigs could be found, whereas with selective methods 32.6% of the broiler herds, 13.1% of the pigs and 12.6% of the cattle turned out to carry E.coli with resistance to third generation cephalosporins. According to susceptibility testing most of these isolates were suspicious for the production of beta-Lactamases of the CTX-M-type (57). There was also a group of isolates that seemed to be pAmC-producers (15) and an other that seemed to be ESBL producers of the TEM- or SHV-type (14).

National evaluation of the recent situation, the trends and sources of infection
The results for E. coli from broilers and pigs were similar to those of previous years. In cattle resistance in E. coli is increasing for ampicillin, sulfomethoxazol, streptomycin and tetracycline. Resistance levels in E. coli from BTM in general are lower than in E. coli from slaughtered animals. Resistance in E.coli was most frequently observed against antimicrobials that have been used in food animals for many years, such as trimethoprim/sulfonamide, tetracycline and streptomycin.

With unselective methods prevalence of E. coli with resistance to third generation cephalosporins was low to very low. With selective methods a higher prevalence could be detected.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

The relatively high prevalence of resistance to ciprofloxacin and nalidixic acid in E. coli from broilers is a potential public health concern.

The occurrence of ESBL/AmpC producing E. coli in Switzerland found with selective methods is lower than in certain other European countries. To assess the public health relevance of the E. coli isolates with a resistance to third generation cephalosporins, these isolates have to be characterized in more detail by molecular methods and compared to clinical and subclinical isolates from humans.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
### Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals)

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<tr>
<th>Antimicrobials</th>
<th>E.coil, non-pathogenic, unspecified</th>
</tr>
</thead>
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<td></td>
<td>Isolates out of a monitoring program (yes/no)</td>
</tr>
<tr>
<td>Number of isolates available in the laboratory</td>
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</tr>
<tr>
<td><strong>Antimicrobials:</strong></td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides - Gentamicin</td>
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</tr>
<tr>
<td>Aminoglycosides - Kanamycin</td>
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<tr>
<td>Aminoglycosides - Streptomycin</td>
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<tr>
<td>Amphenicols - Chloramphenicol</td>
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<tr>
<td>Amphenicols - Florfenicol</td>
<td>18 0</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>18 0</td>
</tr>
<tr>
<td>Penicillins - Ampicillin</td>
<td>18 5</td>
</tr>
<tr>
<td>Quinolones - Nalidixic acid</td>
<td>18 0</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>18 2</td>
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<tr>
<td>Trimethoprim</td>
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</tr>
<tr>
<td>Fully sensitive</td>
<td>18 12</td>
</tr>
<tr>
<td>Resistant to 1 antimicrobial</td>
<td>18 2</td>
</tr>
<tr>
<td>Resistant to 2 antimicrobials</td>
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</tr>
<tr>
<td>Resistant to 3 antimicrobials</td>
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<td>Cephalosporins - Ceftazidim</td>
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<tr>
<td>Polymyxins - Colistin</td>
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### Table Antimicrobial susceptibility testing of E. coli in Cattle (bovine animals)

<table>
<thead>
<tr>
<th>Escherichia coli, non-pathogenic</th>
<th>E. coli, non-pathogenic, unspecified</th>
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<td>Isolates out of a monitoring program (yes/no)</td>
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</tr>
<tr>
<td>Number of isolates available in the laboratory</td>
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</table>

#### Antimicrobials:

| Sulfonamides - Sulfamethoxazol | 18 | 3 |

Footnote:

Bulk tank milk samples
Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]

| Antimicrobials: | Cut-off value | N | <=0.008 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | 1024 | >2048 | lowest | highest |
|-----------------|---------------|---|---------|------|------|------|------|-----|---|---|---|---|---|----|----|-----|-----|------|------|--------|--------|
| Aminoglycosides - Gentamicin | 2 | 18 | 0 | 2 | 14 | 2 | | | | | | | | | | | | | | 0.25 | 32 |
| Aminoglycosides - Kanamycin | 8 | 18 | 2 | | | | 16 | 2 | | | | | | | | | | | | 4 | 128 |
| Aminoglycosides - Streptomycin | 16 | 18 | 5 | 1 | 5 | 7 | 1 | 4 | | | | | | | | | | | | 2 | 128 |
| Amphenicols - Chloramphenicol | 16 | 18 | 1 | | | | 3 | 3 | 9 | 2 | 1 | | | | | | | | | | 2 | 64 |
| Amphenicols - Florfenicol | 16 | 18 | 0 | | | | 3 | 7 | 7 | 1 | | | | | | | | | | | 2 | 64 |
| Cephalosporins - Cefotaxime | 0.25 | 18 | 0 | 17 | | 1 | | | | | | | | | | | | | | | 0.06 | 4 |
| Fluoroquinolones - Ciprofloxacin | 0.64 | 18 | 0 | 2 | 16 | | | | | | | | | | | | | | | 0.008 | 8 |
| Penicillins - Ampicillin | 8 | 18 | 5 | 6 | 6 | 1 | 1 | 4 | | | | | | | | | | | | 0.5 | 32 |
| Quinolones - Nalidixic acid | 16 | 18 | 0 | | | | 18 | | | | | | | | | | | | | | 4 | 64 |
| Tetracyclines - Tetracycline | 8 | 18 | 2 | 4 | 7 | 5 | 2 | | | | | | | | | | | | | | 1 | 64 |
| Trimethoprim | 2 | 18 | 2 | 14 | | 1 | 1 | 2 | | | | | | | | | | | | | | 0.5 | 32 |
| Cephalosporins - Ceftazidim | 0.5 | 18 | 0 | 16 | | 2 | | | | | | | | | | | | | | | 0.25 | 16 |
| Polymyxins - Colistin | 2 | 18 | 0 | | | | 18 | | | | | | | | | | | | | | 2 | 4 |
| Sulfonamides - Sulfamethoxazol | 64 | 18 | 3 | | | | 4 | 7 | 4 | | | | | | | | | | | | 3 | 8 | 1024 |
Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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<td>16</td>
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Concentration (µg/ml), number of isolates with a concentration of inhibition equal to
Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

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<td>Sulfonamides - Sulfamethoxazol</td>
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Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]
Table Antimicrobial susceptibility testing of E. coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

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Concentration (µg/ml), number of isolates with a concentration of inhibition equal to
### Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

<table>
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<tr>
<th>E.coli, non-pathogenic, unspecified</th>
<th>Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications</th>
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<tr>
<td>Number of isolates available in the laboratory</td>
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**Antimicrobials:**

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<th>Antimicrobials</th>
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<th>highest</th>
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<tbody>
<tr>
<td>Aminoglycosides - Gentamicin</td>
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<tr>
<td>Aminoglycosides - Kanamycin</td>
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<tr>
<td>Aminoglycosides - Streptomycin</td>
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<tr>
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### Table Antimicrobial susceptibility testing of E.coli, non-pathogenic, unspecified in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

<table>
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<tr>
<th>Antimicrobials:</th>
<th>E.coli, non-pathogenic, unspecified</th>
<th>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</th>
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<td>Number of isolates available in the laboratory</td>
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Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

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Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Animals

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### Table Cut-off values used for antimicrobial susceptibility testing of Escherichia coli, non-pathogenic in Feed

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3.2 ENTEROCOCCUS, NON-PATHOGENIC

3.2.1 General evaluation of the national situation

3.2.2 Antimicrobial resistance in Enterococcus, non-pathogenic isolates

A. Antimicrobial resistance of Enterococcus spp., unspecified in animal

Sampling strategy used in monitoring

Frequency of the sampling

Enterococci were analysed for antimicrobial resistance in 390 samples from fattening pigs, 200 samples from cattle and 216 samples from broilers. The samples were evenly collected throughout the year in a stratified and randomized sample scheme in the framework of a permanent national monitoring programme on antimicrobial resistance in Swiss food-producing animals. The slaughter plants included in the surveillance programme account for >92% of the total broiler, >85% of the total pig and >80% of the total cattle production in Switzerland. The number of samples for each plant has been determined in proportion to the number of animals slaughtered per year. Additionally 200 bulk tank milk (BTM) samples were randomly collected at the Laboratory, where milk samples from all dairy farms of Switzerland are routinely subjected to quality testing twice a month. The sampling took place during 2 weeks in November 2011 in order to exclude the possibility that one farm could be sampled twice.

Type of specimen taken

Faecal samples from pigs and cattle, cloacal samples from broilers.
BTM samples from dairy cows.

Methods of sampling (description of sampling techniques)

Faecal samples from calves and pigs and 5 cloacal samples from different broilers per slaughter batch were taken at the slaughter line using a swab in standard transportation medium (Transport Swabs, Oxoid TS0001A, AMIES W/O CH). Immediately after collection, the samples were brought to the laboratory for analysis. Cloacal swabs from one slaughter batch were pooled at the laboratory.

The BTM samples are automatically collected on each farm by milk-collection tankers along the milk collecting routes. A large number of farms are also sampled manually at milk collection locations, at dairies and at milk collecting or centrifugation plants. Specially-trained professionals take the samples in accordance with the international standards of the International Dairy Federation (IDF) and the Swiss law. BTM samples are refrigerated at 1 – 5°C and sent to a single laboratory for the milk inspection analyses, where a smaller sample is randomly taken and immediately sent to the ZOBA.

Procedures for the selection of isolates for antimicrobial testing

From each sample and Enterococcus subtype one isolate was submitted to susceptibility testing.

Methods used for collecting data

All samples were analysed in the same laboratory (Centre for Zoonoses, Bacterial Animal Diseases and Antibiotic Resistance, University of Bern, Switzerland).

Laboratory methodology used for identification of the microbial isolates

Samples were cultured for Enterococcus spp. within 72 h after sampling using standard microbiological
Laboratory used for detection for resistance

Antimicrobials included in monitoring

ampicillin, amoxicillin/clavulanic acid (2:1), bacitracin, chloramphenicol, ciprofloxacin, erythromycin, florfenicol, gentamicin, linezolid, neomycin, nitrofurantoin, salinomycin, streptomycin, quinupristin/dalfopristin, tetracyclin, vancomycin

Cut-off values used in testing

Wherever possible the epidemiological cut-offs values according to EUCAST were used.

Preventive measures in place

No specific measures for antimicrobial resistance in Enterococcus spp. General preventive measures include education of veterinarians and farmers and limitation of use of antimicrobials to veterinary prescription.

Results of the investigation

117 Enterococcus faecalis and 13 Enterococcus faecium isolates from broilers, 64 Enterococcus faecalis and 25 Enterococcus faecium from pigs, 37 Enterococcus faecalis and 7 Enterococcus faecium isolates from cattle as well as 19 Enterococcus faecalis from BTM were subjected to susceptibility testing. Resistance were commonly found in Enterococci from all three animal species and from BTM. Very high to extremely high levels of resistance to bacitracin and neomycin were observed in E. faecalis and E. faecium from all three animal species. Very high to extremely high levels of resistance were also found to tetracycline in E. faecalis and to quinupristin/dalfopristin in E. faecium. High levels of resistance were found to erythromycin in E. faecalis and E. faecium from broilers, pigs, cattle and BTM. None of the isolates was resistant against vancomycin.

National evaluation of the recent situation, the trends and sources of infection

The results for slaughtered animals are similar to those in previous years. It was the first time that BTM samples were used in the Swiss antibiotic resistance monitoring. The sampling of BTM turned out to be easy and cost effective. However, to get more accurate results and to be able to find trends of resistance or newly emerging resistances with a certain confidence, there should be tested far more BTM samples.

Relevance of the findings in animals to findings in foodstuffs and to human cases (as a source of infection)

Non-pathogenic Enterococci from food animals may serve as a reservoir for resistance genes which could potentially be transmitted to human pathogens.

Additional information

Further information can be found in the annual report on the sale of antibiotics for veterinary use and antibiotic resistance monitoring of livestock in Switzerland (Arch-Vet 2011) on the FVO website www.bvet.admin.ch
Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

E. faecium

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<td>Nitroimidazoles and Nitrofurans - Nitrofurantoin</td>
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<td>Streptogramins - Quinupristin/Dalfopristin</td>
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Table Antimicrobial susceptibility testing of E. faecium in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]
Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concentration (µg/ml), number of isolates with a concentration of inhibition equal to</td>
</tr>
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### E. faecalis

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Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

<table>
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<tr>
<th>Antimicrobials:</th>
<th>Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications</th>
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<tbody>
<tr>
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<td>E. faecalis</td>
<td>Number of isolates available in the laboratory</td>
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<tr>
<td></td>
<td>117</td>
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<table>
<thead>
<tr>
<th>Antimicrobials:</th>
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<th>highest</th>
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<tbody>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>128</td>
<td>2048</td>
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<td>Aminoglycosides - Neomycin</td>
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<td>2048</td>
</tr>
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<td>Amphenicols - Chloramphenicol</td>
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<td>Amphenicols - Florfenicol</td>
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<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
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<td>Ionophores - Salinomycin</td>
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<td>Macrolides - Erythromycin</td>
<td>0.5</td>
<td>16</td>
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<td>Nitroimidazoles and Nitrofurans - Nitrofurantoin</td>
<td>32</td>
<td>256</td>
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<td>Oxazolidines - Linezolid</td>
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<td>Penicillins - Amoxicillin / Clavulanic acid</td>
<td>2</td>
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<td>Streptogramins - Quinupristin/Dalfopristin</td>
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<td>32</td>
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<td>Table Antimicrobial susceptibility testing of E. faecalis in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]</td>
<td></td>
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</table>
### Table Antimicrobial susceptibility testing of *E. faecium* in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

<p>| Antimicrobials:                                      | Cut-off value | N  | n   | &lt;=0.002 | &lt;=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1   | 2   | 4   | 8   | 16  | 32  | 64  | 128 | 256 | 512 | &gt;1024 | 2048 |
|----------------------------------------------------|---------------|----|-----|---------|---------|-------|-------|-------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|
| <strong>E. faecium</strong>                                      |               |    |     |         |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Isolates out of a monitoring program (yes/no)      |               |    |     |         |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Number of isolates available in the laboratory     |               |    |     |         |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| <strong>Antimicrobials:</strong>                                 |               |    |     |         |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Aminoglycosides - Gentamicin                       | 512           | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Aminoglycosides - Neomycin                         | 16            | 13 | 8   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Aminoglycosides - Streptomycin                      | 128           | 13 | 2   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Amphenicols - Chloramphenicol                       | 32            | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Amphenicols - Florfenicol                           | 8             | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Fluoroquinolones - Ciprofloxacin                    | 4             | 13 | 1   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Penicillins - Ampicillin                            | 4             | 13 | 1   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Tetracyclines - Tetracycline                        | 4             | 13 | 6   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin | 32           | 13 | 10  | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin | 4            | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Ionophores - Salinomycin                            | 8             | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Macrolides - Erythromycin                          | 4             | 13 | 3   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Nitroimidazoles and Nitrofurans - Nitrofurantoin    | 256           | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Oxazolidines - Linezolid                            | 4             | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Penicillins - Amoxicillin / Clavulanic acid         | 4             | 13 | 0   | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |
| Streptogramins - Quinupristin/Dalfopristin          | 1             | 13 | 11  | 0       |         |       |       |       |      |      |      |      |     |     |     |     |     |     |     |     |     |     |     |      |      |</p>
<table>
<thead>
<tr>
<th>E. faecium</th>
<th>Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications</th>
</tr>
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<tbody>
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<td>Aminoglycosides - Neomycin</td>
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<td>Aminoglycosides - Streptomycin</td>
<td>lowest: 128, highest: 2048</td>
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<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>lowest: 2, highest: 64</td>
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<td>Fluoroquinolones - Ciprofloxacin</td>
<td>lowest: 0.5, highest: 32</td>
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<tr>
<td>Penicillins - Ampicillin</td>
<td>lowest: 2, highest: 128</td>
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<td>Tetracyclines - Tetracycline</td>
<td>lowest: 1, highest: 32</td>
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<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
<td>lowest: 8, highest: 256</td>
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<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>lowest: 1, highest: 32</td>
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<td>Ionophores - Salinomycin</td>
<td>lowest: 1, highest: 32</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>lowest: 0.5, highest: 16</td>
</tr>
<tr>
<td>Nitroimidazoles and Nitrofurans - Nitrofurantoin</td>
<td>lowest: 32, highest: 256</td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>lowest: 0.5, highest: 32</td>
</tr>
<tr>
<td>Penicillins - Amoxicillin / Clavulanic acid</td>
<td>lowest: 2, highest: 64</td>
</tr>
<tr>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
<td>lowest: 0.5, highest: 32</td>
</tr>
</tbody>
</table>
Table Antimicrobial susceptibility testing of E. faecium in Gallus gallus (fowl) - broilers - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - cloacal swab - quantitative data [Dilution method]
Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

<table>
<thead>
<tr>
<th>E. faecalis</th>
<th>Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antimicrobials:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Isolates out of a monitoring program (yes/no)</td>
</tr>
<tr>
<td></td>
<td>Cut-off value</td>
</tr>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>512</td>
</tr>
<tr>
<td>Aminoglycosides - Neomycin</td>
<td>16</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>512</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>32</td>
</tr>
<tr>
<td>Amphenicols - Florfenicol</td>
<td>8</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>4</td>
</tr>
<tr>
<td>Penicillins - Ampicillin</td>
<td>4</td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>4</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
<td>32</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>4</td>
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<tr>
<td>Ionophores - Salinomycin</td>
<td>8</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>4</td>
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<tr>
<td>Nitrimidazoles and Nitrofurans - Nitrofurantoin</td>
<td>32</td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>4</td>
</tr>
<tr>
<td>Penicillins - Amoxicillin / Clavulanic acid</td>
<td>4</td>
</tr>
<tr>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
<td>16</td>
</tr>
</tbody>
</table>

293
Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Isolates out of a monitoring program (yes/no)</th>
<th>Number of isolates available in the laboratory</th>
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<tbody>
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### Antimicrobials:

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<thead>
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<th>highest</th>
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<tbody>
<tr>
<td>Aminoglycosides - Gentamicin</td>
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<td>2048</td>
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<tr>
<td>Aminoglycosides - Neomycin</td>
<td>8</td>
<td>128</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>128</td>
<td>2048</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>Amphenicols - Florfenicol</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
<td>0.5</td>
<td>32</td>
</tr>
<tr>
<td>Penicillins - Ampicillin</td>
<td>2</td>
<td>128</td>
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<td>Tetracyclines - Tetracycline</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
<td>8</td>
<td>256</td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>1</td>
<td>32</td>
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<tr>
<td>Ionophores - Salinomycin</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>0.5</td>
<td>16</td>
</tr>
<tr>
<td>Nitromidazoles and Nitrofurans - Nitrofurazin</td>
<td>32</td>
<td>256</td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>0.5</td>
<td>32</td>
</tr>
<tr>
<td>Penicillins - Amoxicillin / Clavulanic acid</td>
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<td>64</td>
</tr>
<tr>
<td>E. faecalis</td>
<td>Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]</td>
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<tr>
<td>------------</td>
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<tr>
<td>Antimicrobials:</td>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
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</tr>
<tr>
<td>Isolates out of a monitoring program (yes/no)</td>
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<td>32</td>
</tr>
<tr>
<td>Number of isolates available in the laboratory</td>
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</table>
### Table Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
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<th>Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications</th>
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<td>Cut-off value</td>
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<td></td>
<td>Aminoglycosides - Neomycin</td>
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<td></td>
<td>Aminoglycosides - Streptomycin</td>
</tr>
<tr>
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<td>Amphenicols - Florfenicol</td>
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<td>Tetracyclines - Tetracycline</td>
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<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
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<td></td>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
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<td>Ionophores - Salinomycin</td>
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<td></td>
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<td>Macrolides - Erythromycin</td>
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<tr>
<td></td>
<td></td>
<td>Nitroimidazoles and Nitrofurans - Nitrofurantoin</td>
</tr>
<tr>
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<td>Oxazolidines - Linezolid</td>
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<tr>
<td></td>
<td></td>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
</tr>
<tr>
<td>Isolates out of a monitoring program (yes/no)</td>
<td>E. faecalis</td>
<td>Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>------------</td>
<td>-------------------------------------------------------------------------</td>
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<td>Number of isolates available in the laboratory</td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Isolates out of monitoring program (yes/no)</th>
<th>Pigs - fattening pigs - at slaughterhouse - Monitoring - EFSA specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>128 2048</td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides - Neomycin</td>
<td>8 128</td>
<td></td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>128 2048</td>
<td></td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>2 64</td>
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<tr>
<td>Amphenicols - Florfenicol</td>
<td>2 32</td>
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<td>Fluoroquinolones - Ciprofloxacin</td>
<td>0.5 32</td>
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<tr>
<td>Penicillins - Ampicillin</td>
<td>2 128</td>
<td></td>
</tr>
<tr>
<td>Tetracyclines - Tetracycline</td>
<td>1 32</td>
<td></td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
<td>8 256</td>
<td></td>
</tr>
<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
<td>1 32</td>
<td></td>
</tr>
<tr>
<td>Ionophores - Salinomycin</td>
<td>1 32</td>
<td></td>
</tr>
<tr>
<td>Macrolides - Erythromycin</td>
<td>0.5 16</td>
<td></td>
</tr>
<tr>
<td>Nitroimidazoles and Nitrofurans - Nitrofurantin</td>
<td>32 256</td>
<td></td>
</tr>
<tr>
<td>Oxazolidines - Linezolid</td>
<td>0.5 32</td>
<td></td>
</tr>
<tr>
<td>Penicillins - Amoxicillin / Clavulanic acid</td>
<td>2 64</td>
<td></td>
</tr>
<tr>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
<td>0.5 32</td>
<td></td>
</tr>
</tbody>
</table>
Table: Antimicrobial susceptibility testing of E. faecalis in Pigs - fattening pigs - at slaughterhouse. Monitoring - EFSA specifications - Objective
sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]
### Table Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

Concentration (µg/ml), number of isolates with a concentration of inhibition equal to

| Antimicrobials: | Cut-off values | N | n | <=0.002 | <=0.004 | 0.008 | 0.015 | 0.016 | 0.03 | 0.06 | 0.12 | 0.25 | 0.5 | 1 | 2 | 4 | 8 | 16 | 32 | 64 | 128 | 256 | 512 | >4096 | 1024 | 2048 |
|----------------|----------------|---|---|----------|----------|-------|-------|-------|-------|-------|-------|-------|-----|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **E. faecium** |               |   |   |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Isolates out of a monitoring program (yes/no) | Number of isolates available in the laboratory | 7 |
| **Antimicrobials:** |                |   |   |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Aminoglycosides - Gentamicin | 512 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Aminoglycosides - Neomycin | 16 | 7 | 3 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Aminoglycosides - Streptomycin | 128 | 7 | 5 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Amphenicols - Chloramphenicol | 32 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Amphenicols - Florfenicol | 8 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Fluoroquinolones - Ciprofloxacin | 4 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Penicillins - Ampicillin | 4 | 7 | 1 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Tetracyclines - Tetracycline | 4 | 7 | 5 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin | 32 | 7 | 7 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin | 4 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Ionophores - Salinomycin | 8 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Macrolides - Erythromycin | 4 | 7 | 2 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Nitroimidazoles and Nitrofurans - Nitrofurantoin | 256 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Orazydines - Linezolid | 4 | 7 | 0 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Penicillins - Amoxicillin / Clavulanic acid | 4 | 7 | 1 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Streptogramins - Quinupristin/Dalfopristin | 1 | 7 | 4 |          |          |       |       |       |       |       |       |       |     |     |   |   |   |   |   |   |   |   |   |   |   |   |   |
### Table: Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials</th>
<th>Isolates out of a monitoring program (yes/no)</th>
<th>Number of isolates available in the laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>E. faecium</td>
<td></td>
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<tr>
<td>Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications</td>
<td></td>
<td></td>
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<tr>
<td>Aminoglycosides - Gentamicin</td>
<td>128</td>
<td>2048</td>
</tr>
<tr>
<td>Aminoglycosides - Neomycin</td>
<td>8</td>
<td>128</td>
</tr>
<tr>
<td>Aminoglycosides - Streptomycin</td>
<td>128</td>
<td>2048</td>
</tr>
<tr>
<td>Amphenicols - Chloramphenicol</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>Amphenicols - Florfenicol</td>
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<td>32</td>
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<tr>
<td>Fluoroquinolones - Ciprofloxacin</td>
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<td>Penicillins - Ampicillin</td>
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<tr>
<td>Tetracyclines - Tetracycline</td>
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<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
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<td>256</td>
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<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
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<td>32</td>
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<td>Ionophores - Salinomycin</td>
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<tr>
<td>Macrolides - Erythromycin</td>
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<tr>
<td>Nitrimidazoles and Nitrofurans - Nitrofurantoin</td>
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<tr>
<td>Oxazolidines - Linezolid</td>
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<tr>
<td>Penicillins - Amoxicillin / Clavulanic acid</td>
<td>2</td>
<td>64</td>
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</table>
### Table Antimicrobial susceptibility testing of E. faecium in Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications - Objective sampling - Official sampling - animal sample - faeces - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antimicrobials:</th>
<th>Cattle (bovine animals) - meat production animals - young cattle (1-2 years) - at slaughterhouse - Monitoring - EFSA specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolates out of a monitoring program (yes/no)</td>
<td>Number of isolates available in the laboratory</td>
</tr>
<tr>
<td>Streptogramins - Quinupristin/Dalfopristin</td>
<td>0.5 32</td>
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</tbody>
</table>
### Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]

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<th>256</th>
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<th>&gt;4096</th>
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<th>2048</th>
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### Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Isolates out of a monitoring program (yes/no)</th>
<th>Number of isolates available in the laboratory</th>
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<td>Fluoroquinolones - Ciprofloxacin</td>
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<tr>
<td>Penicillins - Ampicillin</td>
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<tr>
<td>Tetracyclines - Tetracycline</td>
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<td>Glycopeptides (Cyclic peptides, Polypeptides) - Bacitracin</td>
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<tr>
<td>Glycopeptides (Cyclic peptides, Polypeptides) - Vancomycin</td>
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<tr>
<td>Ionophores - Salinomycin</td>
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<td>Macrolides - Erythromycin</td>
<td>0.5</td>
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<tr>
<td>Nitroimidazoles and Nitrofurans - Nitrofurantoin</td>
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<td>Oxazolidines - Linezolid</td>
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<td>Penicillins - Amoxicillin / Clavulanic acid</td>
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<td>Streptogramins - Quinupristin/Dalfopristin</td>
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Table Antimicrobial susceptibility testing of E. faecalis in Cattle (bovine animals) - dairy cows - adult - at farm - Monitoring - active - Objective sampling - Official sampling - animal sample - milk (Bulk tank milk samples) - quantitative data [Dilution method]
<table>
<thead>
<tr>
<th>Test Method Used</th>
<th>Standard methods used for testing</th>
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<table>
<thead>
<tr>
<th>Concentration (microg/ml)</th>
<th>Zone diameter (mm)</th>
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</thead>
<tbody>
<tr>
<td>Standard</td>
<td>Resistant &gt;</td>
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<td>Resistant &lt;=</td>
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<tr>
<td>Aminoglycosides</td>
<td></td>
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<tr>
<td>Gentamicin</td>
<td>NON-EFSA</td>
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<td>Streptomycin</td>
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<tr>
<td>Amphenicols</td>
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<tr>
<td>Chloramphenicol</td>
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<td>Glycopeptides (Cyclic peptides, Polypeptides)</td>
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<td>Vancomycin</td>
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<td>Macrolides</td>
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<td>Erythromycin</td>
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<td>Oxazolidines</td>
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<td>Linezolid</td>
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<td>Penicillins</td>
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<td>Ampicillin</td>
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<td>Streptogramins</td>
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<td>Quinupristin/Dalfopristin</td>
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<td>Tetracyclines</td>
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<td>NON-EFSA</td>
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</table>
**Table Cut-off values for antibiotic resistance of E. faecalis in Feed**

<table>
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<td>Resistant &gt;</td>
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<tr>
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<tr>
<td><strong>Glycopeptides (Cyclic peptides, Polypeptides)</strong></td>
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<td>Vancomycin</td>
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<td><strong>Macrolides</strong></td>
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<td>Erythromycin</td>
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<td><strong>Oxazolidines</strong></td>
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<td>Linezolid</td>
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<td><strong>Penicillins</strong></td>
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<td>Ampicillin</td>
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<td>Quinupristin/Dalfopristin</td>
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Table Cut-off values for antibiotic resistance of E. faecalis in Food

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<td>Ampicillin</td>
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## Table Cut-off values for antibiotic resistance of E. faecium in Animals

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### Table Cut-off values for antibiotic resistance of E. faecium in Feed

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# Table Cut-off values for antibiotic resistance of E. faecium in Food

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4. INFORMATION ON SPECIFIC MICROBIOLOGICAL AGENTS
4.1 ENTEROBACTER SAKAZAKII

4.1.1 General evaluation of the national situation

4.2 HISTAMINE

4.2.1 General evaluation of the national situation

4.3 STAPHYLOCOCCAL ENTEROTOXINS

4.3.1 General evaluation of the national situation
5. FOODBORNE

Foodborne outbreaks are incidences of two or more human cases of the same disease or infection where the cases are linked or are probably linked to the same food source. Situation, in which the observed human cases exceed the expected number of cases and where a same food source is suspected, is also indicative of a foodborne outbreak.
A. Foodborne outbreaks

System in place for identification, epidemiological investigations and reporting of foodborne outbreaks

The Swiss Federal Office of Public Health (FOPH) coordinates the national surveillance of communicable diseases. Notifications of physicians and laboratories are made to cantonal (regional) health authorities and to the FOPH under the provisions of the public health legislation, namely the Ordinance on Disease Notification of 13th January 1999.

Under this scheme, data provided for each notification depend on its supplier: (i) laboratories report diagnostic confirmations (subtype, method, material) while for selected diseases (ii) physicians additionally cover the subsidiaries of clinical diagnosis, exposition, development and measures. Besides the case-oriented reporting, physicians also have to report observations of unexpected clusters of any communicable disease. At the FOPH, the combined notifications of laboratories and physicians are analyzed and published in the weekly Bulletin.

The surveillance of food-borne infectious agents follows the mandatory system. The laboratories are required to report identifications of Salmonella causing gastroenteritis, Salmonella Typhi, Salmonella Paratyphi, Campylobacter spp., Shigella spp., verotoxin-positive Escherichia coli, Listeria monocytogenes, Clostridium botulinum and hepatitis A virus. A complementary notification by physicians is required for typhoid/paratyphoid fever, diseases associated with verotoxin-positive Escherichia coli, botulism and hepatitis A. Following a modification of the Ordinance on Disease Notification, laboratories are additionally required to report identifications of Trichinella spp. since 1st January 2009.

Basically, the responsibility for outbreak investigations lies with the cantonal authorities. Relevant data of outbreaks are reported in a standardized format to the FOPH as soon as the investigations are accomplished. On request, the FOPH offers the cantons its expertise in epidemiology, infectious diseases, food microbiology, risk assessment and risk management. However, under the federal law on the Control of Transmissible Diseases of Man and the federal law on Food-Stuffs and Utility Articles, the central government, and in particular the FOPH, have the duty to supervise the enforcement of the concerned legislation. In cases of outbreaks which are not limited to the territory of one canton, the federal authorities have the competence to coordinate, and if necessary, to direct control actions and information activities of the cantons. In such a situation, the FOPH can conduct its own epidemiological investigations in cooperation with its national reference laboratories. In the field of food-borne diseases, the FOPH is supported by the National Centre for Enteropathogenic Bacteria and Listeria (NENT). This reference laboratory disposes of the facilities, techniques and agents required not only to confirm results from other laboratories but also for epidemiological typing (serotyping and molecular typing) of various bacterial pathogens.

Description of the types of outbreaks covered by the reporting:

The outbreaks were categorised according to the "Manual for reporting of food-borne outbreaks in accordance with Directive 2003/99/EC from the year 2011”.

National evaluation of the reported outbreaks in the country:

Trends in numbers of outbreaks and numbers of human cases involved

The number of outbreaks is too low to calculate precise trends. However, it can be clearly stated that the number of outbreaks decreased continuously since the mid 1980 ies. One reason for that is certainly the successful eradication of S. Enteritidis in layer flocks where the prevalence became very low. The implementation of HACCP-systems in food businesses may also have had an influence.
Relevance of the different type of places of food production and preparation in outbreaks

Restaurants and similar places for collective catering were the most frequent settings of outbreaks.

Evaluation of the severity and clinical picture of the human cases

The available clinical data are not very good since this aspect is not in the main focus of the competent authorities. Surprisingly, there were also short hospitalizations in cases of intoxications with histamines and SET. Probably, persons with symptoms more often directly go to emergency stations of hospitals.

Control measures or other actions taken to improve the situation

In Switzerland, the number of outbreaks is already quite low. Therefore, it will be difficult to get a further decrease.
<table>
<thead>
<tr>
<th>Weak evidence or no vehicle outbreaks</th>
<th>Number of outbreaks</th>
<th>Human cases</th>
<th>Hospitalized</th>
<th>Deaths</th>
<th>Strong evidence Number of Outbreaks</th>
<th>Total number of outbreaks</th>
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<tr>
<td>Salmonella - S. Typhimurium</td>
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<td>Number of outbreaks</td>
<td>Human cases</td>
<td>Hospitalized</td>
<td>Deaths</td>
<td>Strong evidence Number of Outbreaks</td>
<td>Total number of outbreaks</td>
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### Weak evidence or no vehicle outbreaks

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<th>Unknown agent</th>
<th>Number of outbreaks</th>
<th>Human cases</th>
<th>Hospitalized</th>
<th>Deaths</th>
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Table Foodborne Outbreaks: detailed data for Listeria

Please use CTRL for multiple selection fields

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<thead>
<tr>
<th>L. monocytogenes - L. monocytogenes serovar 1/2a</th>
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<th>Value</th>
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<table>
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<th>FBO Code</th>
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<td>Number of deaths</td>
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<td>Food vehicle</td>
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<td>Outbreak type</td>
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<td>Setting</td>
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<td>Place of origin of problem</td>
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<td>Origin of food vehicle</td>
<td>Intra EU trade</td>
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<td>Contributory factors</td>
<td>Cross-contamination</td>
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<td>Additional information</td>
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<td>Fish and fish products</td>
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<td>Descriptive epidemiological evidence</td>
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<td>General</td>
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<tr>
<td>Setting</td>
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<td>Place of origin of problem</td>
<td>Restaurant/Café/Pub/Bar/Hotel/Catering service</td>
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<td>Origin of food vehicle</td>
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<td>Contributory factors</td>
<td>Storage time/temperature abuse</td>
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<tr>
<td>Mixed Outbreaks (Other Agent)</td>
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<td>Additional information</td>
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